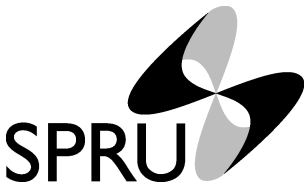


Policy additionality for UK emissions trading projects

A report for the Department of Trade & Industry

Steve Sorrell and
Adrian Smith

SPRU

March 2002

Contact: Steve Sorrell
Environment Group
SPRU (Science & Technology Policy Research)
Mantell Building
University of Sussex, Falmer
Brighton, East Sussex BNB 9RF
Tel: 00 44 1273 877067
Fax: 00 44 1273 685865
e-mail: s.r.sorrell@sussex.ac.uk
web:http://www.sussex.ac.uk/spru/environment

Contents

Tables & Figures

1. Introduction

This report has been prepared by SPRU for the Department of Trade and Industry, as part of the project *Developing Guidance for UK Emissions Trading Projects*. This project is co-ordinated by the Centre for Environmental Strategy at the University of Surrey, and also involves the Joint Implementation Network at the University of Groningen.

The aim of the report to provide an overview of existing and proposed EU and UK climate policies that will be relevant to assessing the *additionality* of proposed emissions trading projects. Climate policy is interpreted in a broad sense here to include all policies that have a primary or secondary aim of reducing GHG emissions. These include policies that are often classified under other headings, such as waste policy. The report contributes to Phase 1 of the project, *Advice on Key Policy Issues*, and should be read in conjunction with the other contributions to Phase 1 - in particular the work on defining additionality.

1.1 Priority sectors

The DTI has advised that the following five 'sectors' are priority areas for emissions trading projects:

- Built environment
- CHP (including Micro CHP)
- Electricity generation
- Methane recovery from landfill and mines
- Transport

The DTI has also advised that the domestic sector has been ruled out for emissions trading projects.

Two points about this list should be noted. First, the list combines industrial sectors (electricity generation) with particular technologies (CHP). This means that there is considerable overlap between the 'sectors'. For example, CHP projects may be used in methane recovery and in buildings, while electricity generation plant may be fuelled by methane from landfill and thereby qualify as renewable electricity under the UK Renewables Obligation. As a result, there is corresponding overlap between the policies that are relevant to each 'sector'. Table 1.1 groups climate policy under five broad headings and indicates which of the five sectors these influence.

Second, the rationale for excluding the domestic sector from the crediting scheme is unclear. This also leads to the exclusion of community heating CHP projects and the majority of micro-CHP projects, despite the latter being specifically identified on the priority list. Following this advice, policies relevant to the domestic sector are not included in this report. But comments questioning the rationale for this decision are included in Annex 1.

Table 1.1 Mapping policy areas onto the priority sectors

	Buildings	**CHP**	**Electricity generation**	**Methane recovery**	**Transport**
Energy supply policy	✓	✓	✓	✓	
Energy efficiency policy	✓	✓	✓		
Waste policy		✓	✓	✓	
Transport policy					✓
Land use policy	✓				✓

1.2 Report structure

The report is structured as follows.

Section 1 provides an introductory discussion of the role of projects in the UK ETS, an interpretation of additionality and policy additionality, a classification scheme for climate policy, and a brief discussion of the problems of system boundaries and leakage in crediting schemes. Here it is noted that if the changes brought about by a project are already *required, funded, supported or encouraged* by other policy initiatives there is a risk that the policy additionality requirement will not been met. The importance of individual policies will depend upon the methodology that is chosen for estimating additionality.

The following five sections examine the priority sectors in turn and seek to identify those policies that require, fund, support or encourage carbon abatement in each sector. For the first four priority sectors, the structure is as follows:

- indicating the contribution of the sector to UK carbon emissions and carbon abatement;
- identifying some potential project types in the sector;
- listing the major policy influences on the sector, using the framework developed in section 1; and
- describing a selection of these policies in more detail, and discussing their implications for the assessment of additionality.

For the transport sector, the description of individual policies is omitted. This is because the range of policies relevant to projects in this sector is extremely large. A more detailed evaluation is not possible within the scope of the current project.

Many policies (e.g. the climate change levy) are relevant to more than one sector. Generally, such policies are only described once in the report, and then cross-referenced in subsequent sections with the relevant issues identified.

The report draws on research in the project *Interaction in EU Climate Policy*, funded by the European Commission under the Framework 5 Program and co-ordinated by SPRU.[1]

[1] http://www.sussex.ac.uk/spru/environment/research/interact.html

2. Projects, additionality and UK climate policy

This section provides an introductory discussion of the role of projects in the UK ETS, an interpretation of additionality and policy additionality, a classification scheme for climate policy, and a brief discussion of the problems of system boundaries and leakage in crediting schemes.

2.1 The position of projects in the UKETS

There are three types of participant in the UKETS:

- cap and trade (the absolute sector);
- sectoral baseline and credit (the CCLA sector);
- project baseline and credit (the project sector).

The basic structure is illustrated in Figure 1.1. The CCLA sector consists of firms participating in a Climate Change Levy Agreement (CCLA). These can be split into two groups: those having *relative* targets (GWh/output; tCO_2e/output), and those having *absolute* targets (GWh or tCO_2e). The trading rules differ between these two groups, so it is useful to further distinguish between:

- *the CCLA relative sector*: those CCLA companies with *relative* targets
- *the CCLA absolute sector*: those CCLA companies with *absolute* targets

Figure 1.2 shows this additional subdivision and also illustrates the possible trading routes between different sectors in the scheme.

Figure1.1 Structure of the UK emissions trading scheme

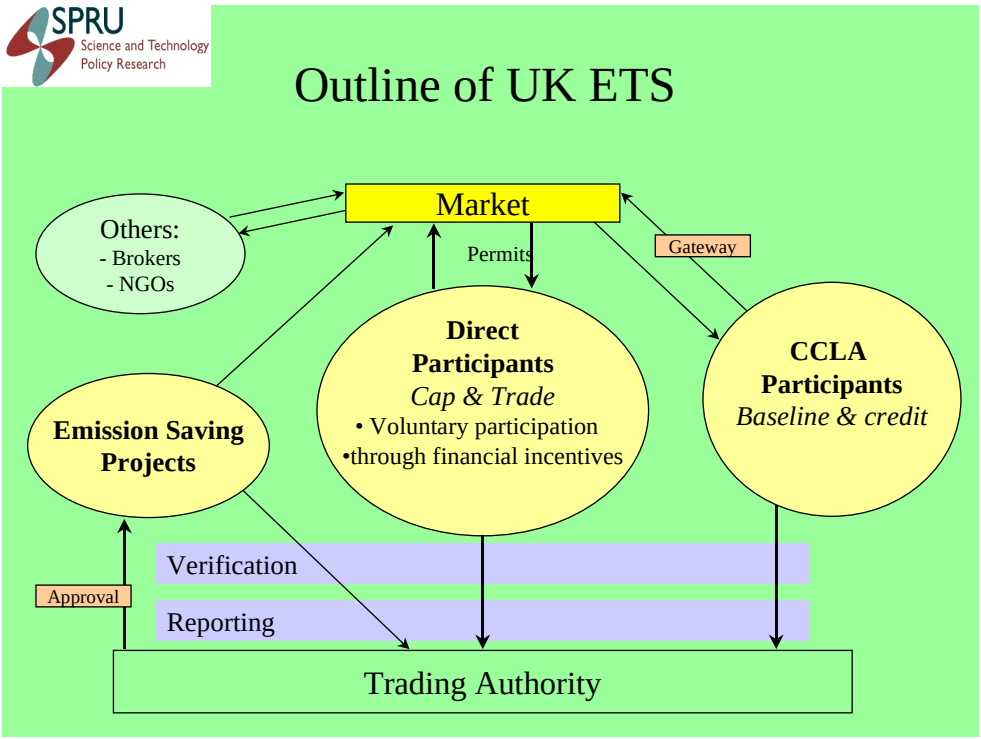
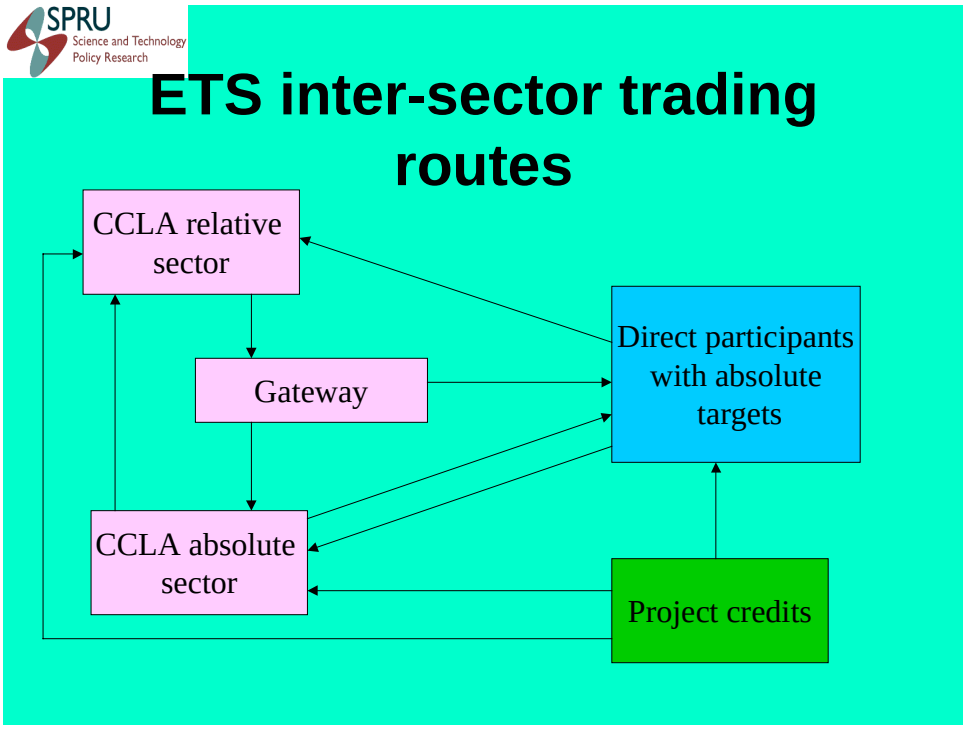


Figure 1.2 Trading routes in the UK emissions trading scheme



The three basic sectors are as follows:

- *Cap and trade (absolute sector):* The focus of the proposals is a cap and trade scheme for organisations that take on an absolute emissions target. The most important point to note is that this is a *voluntary* scheme in which a financial incentive is provided by government to encourage organisations to take on a cap. This means that the scope of the scheme will depend upon the response to the incentive and is not defined at the outset. A total of £215 million has been made available, equivalent to £30 million per year after corporation tax. Participating organisations will be required to make absolute reductions in emissions against a 1998-2000 baseline. The target and the level of incentive payment will be set through a competitive bidding process, subject to certain rules including a limit on the proportion of the total incentive going to a single participant. Organisations will be required to deliver five equal annual emission reductions to qualify for the incentive payments. A wide range of organisations in the industrial, commercial and public sectors are eligible to participate, but not sources that are already subject to a CCLA. Participating organisations that are eligible for the Climate Change Levy (CCL) will still be required to pay it.
- *Sectoral baseline and credit (CCLA sector)*: The second element of the scheme relates to energy intensive companies that already have targets through the CCLAs. These targets are denominated in either energy use (GWh), energy intensity (GWh/unit of output), GHG emissions (MtC equivalent), or GHG intensity (MtC/unit of output) and apply at two yearly intervals up to 2010. Such companies will be able to use the trading scheme to help meet their target or to sell any over-achievement if they do better than their target. Most of the targets under the CCLAs are defined in terms of energy intensity (unit targets) rather than carbon emissions (absolute targets). This creates problems for participation in a trading scheme as increases in output from a sector can lead to increases in emissions - i.e. there is not the certainty of an absolute emissions cap. As a consequence of this, trading by CCLA participants with relative targets will be subject to restrictions to prevent inflation in the total number of allowances. In particular a 'Gateway' will control the flow of allowances from the CCLA sector into the rest of the trading scheme.
- *Project baseline and credit (project sector)*: The third and least developed element of the scheme relates to individual emission reduction projects. Organisations will be able to undertake such projects in the UK and sell the resulting allowances into the scheme. The allowances can then be used by other participants to meet their targets. As with JI & CDM, the project must deliver emission reductions which are additional to business as usual.

2.2 Defining additionality

The primary requirement for project based activities is that the emission reductions associated with the project are *additional* - i.e. they would not have occurred in the absence of the project. In practice, additionality is demonstrated by comparing project emissions with the 'business–as-usual' or baseline emissions scenario.

Two broad types of additionality can be distinguished:

- *Environmental additionality*: This is determined by quantifying the difference between the GHG emissions of the project and those of a baseline scenario, where the latter is a counterfactual estimate of emissions. The requirement for a baseline introduces an irreducible element of uncertainty into project crediting.
- *Financial additionality*: This is subject to varying interpretations. One is where a project would not have been financially viable in the absence of additional revenue from the sale of credits. Another is where institutional, financial technological or informational barriers to the project would not have been overcome without the incentive provided by the crediting arrangements. In practice, this requirement is very difficult to operationalise.

The baseline scenario is a *projection* of emissions over an appropriate time period. At its simplest, this may be an extrapolation of current trends. At its most complex, it could involve a simulation of future investment decisions and technology performance. The estimation of a scenario could therefore imply differing degrees of complexity and resources intensiveness.

The development of a baseline scenario may require assumptions about technical, economic, financial, regulatory and political circumstances over the duration of the scenario. These may include assumptions about existing or planned climate policy instruments. For example, when developing the baseline for an industrial CHP project, it may be necessary to consider the impact of the Climate Change Levy (CCL) on emissions from the site. This will include estimates of the improvement in fuel and electrical efficiency throughout the site that would result from the CCL price incentive. Emissions from the site are likely to be lower with the CCL than without, and this reduction may need to factored into the scenario. If this were not done (e.g. if the baseline assumed that emissions remained unchanged), the estimated emission reductions resulting from the CHP project would be overestimated, and with it the number of credits.

In addition, it may be necessary to consider whether the project would have gone ahead *anyway* in a business-as-usual scenario. This will be particularly relevant in the case of a CHP project for example, as CHP is exempt from the CCL and is hence a more attractive investment. But to assess this, it would be necessary to simulate likely investment decisions during the course of the scenario. This is a very difficult undertaking, and would require assumptions about appropriate investment criteria; and the role and importance of different barriers to investment, such as hidden costs and risk. These are complex and contentious issues (Sorrell, 2000).

Consideration of the existing and planned climate policy mix can be a central element in such determinations of additionality. The relevant question is whether the emission reductions would have been achieved by existing or planned climate policy in the absence of the crediting scheme. If the emission reductions were *required* by some aspect of climate policy (e.g. an emission limit), then there is no additionality from the project. This is the simplest case, but it may be relatively rare in practice. What is more likely is that the climate policy instruments change the counterfactual baseline by making an investment *more likely* to go ahead. For example, the existence of the CCL makes the CHP project more likely to go ahead.

In the first, case additionality can be determined solely in relation to climate policy targets and is relatively simple to assess. In the second case, additionality must be assessed in relation to a baseline scenario, which includes estimates of the impact of climate policy instruments. This requires assessment of the economics of different projects and how these are changed by the existence of the instruments. Political circumstances may also be relevant – such as where the existence of a voluntary target provides a greater incentive to make energy efficiency investments. In general, if the changes brought about by a project are already *required, funded, supported or encouraged* by other policy initiatives, there is a risk that the policy additionality requirement will not be met.

A range of policies may need to be considered when developing a project baseline. Assumptions may be required about the impact of:

- existing policy measures;
- planned policy measures, where details such as date of introduction are known; and
- possible policy measures, where there are varying degrees of uncertainty.

The importance of these will depend upon the *duration* of the baseline or crediting period, and whether or not baselines may be *adjusted* during their lifetime. For example, the longer the duration of the baseline the greater the importance of possible policy measures. In turn, the nature of planned or possible policy measures may influence decisions on the duration and adjustment of baselines.

For the UK project scheme, the greatest uncertainty relates to proposed EU Emissions Trading Directive (EUETS) (CEC, 2001a). There are uncertainties over the date of introduction of this scheme, whether it will be mandatory, and a range of detailed design issues such as allocation rules. But the inclusion of electricity generators within the EU scheme seems certain. This is important as it creates a serious conflict with both the UKETS and broader UK climate policy, such as the CCLAs. This is because the latter effectively assigns ownership of ESI emissions to electricity consumers, while the EUETS assigns ownership to electricity generators. This issue is of fundamental importance to the UK project scheme, and is discussed in more detail in section 4.7.

2.3 Characterising climate policy

It is common in the climate policy literature to use a simple binary classification of policy instruments, with ‘command and control’ on the one hand and ‘economic instruments’ on the other. This greatly oversimplifies the reality of climate policy, where a much broader range of instruments are employed. There are numerous ways of classifying these instruments, none of which are entirely satisfactory as there are numerous overlaps between instrument categories. For example, are negotiated agreements a voluntary approach or a command & control approach? Is a site bubble an economic instrument or a command & control regulation?.

Table 1.2 proposes a broad classification of climate policy instruments for use in this survey. The table lists policy categories in increasing order of *prescriptiveness* . At

one extreme a technology-based standard unambiguously requires the adoption of a particular technology. At the other extreme an education programme merely provides a weak incentive for a particular form of action. While all these policies will be relevant to a discussion of additionality, their importance will vary with their level of prescriptiveness. The impact of highly prescriptive policies which require a certain action is very easy to assess. In contrast, the impact of weakly prescriptive policies such as information programmes is virtually impossible to assess. The impact of policies in the middle of this range, such as energy taxes, may be very important for the assessment of additionality, but difficult to assess as it requires assessment of project economics and the relative importance of different barriers to investment.

In sections 3 to 7, the specific policy measures relevant to each priority area (e.g. CHP) will be classified according to this framework. In each case, we will describe a *subset* of these policies in more detail. The policies selected will be the more prescriptive ones - i.e. those that seem particularly important in the assessment of project additionality.

Table 1.2 A typology of climate policy instruments

Broad category	Instrument type	Nature	UK Climate Program examples
Education, information & moral suasion	Education, information & moral suasion	Corrects lack of information, builds capacity to respond, appeals to values and/or attempts to modify values	• Energy efficiency best practice program • Energy labelling of domestic appliances • Design Advice Scheme
Voluntary approaches	Unilateral commitments	Voluntary undertaking by firms or industry groups	• Voluntary energy efficiency agreements (e.g. hotel sector)
	Public voluntary schemes	Voluntary adoption of standards, procedures, targets etc. which have been developed by public bodies	• Making a Corporate Commitment Campaign • EMAS
	Negotiated agreements	Contracts between public authorities and industry including targets, timetable and implicit or explicit sanctions for non compliance.	• Climate change levy agreements
Economic instruments	Charge systems	Internalises external costs through charges on consumption or production	• Climate change levy
	Trading mechanisms	Creates a market in pollution rights	• UKETS cap and trade program • UKETS credit program • Renewables obligation certificates
	Financial instruments	Mobilising financial resources for environmental protection (e.g. loans, funds, tax breaks)	• Enhance capital allowances for investment in energy efficient equipment • Subsidies of energy audits

	Liability instruments	Inducement to internalise external costs through threat of subsequent legal action to recover costs	
	Removal of perverse incentives	Removal of existing subsidies to environmentally damaging activities and products	• Removal of subsidies for coal production
Command and control	Framework based standards	Qualitative performance requirements requiring interpretation	• BAT in IPPC
	Performance based standards	Uniform quantitative performance requirements	• Building regulations
	Technology based standards	Uniform requirement to use a particular technology	• Building regulations

Source: Sorrell (2000)

2.4 Project particpants, system boundaries and leakage

Project participants

There are three parties that are relevant:

- *Investors*: These are legal entities who see regulatory or commercial benefits in sponsoring projects. They may be either private or public organisations and may be either national, foreign or multinational.
- *Users of credits*: These are the legal entities who wish to obtain credits to meet their regulatory obligations. Users may either be located in the UK or overseas. In the latter case, prior to 2008 there needs to be bilateral agreement on the transfer of credits between the UK and other countries. Post 2008, the transfer must be consistent with the international rules for JI and IET.
- *Hosts*: These are the organisations who have interests in the project itself. For example, a local authority will have an interest in an energy efficiency project located within social housing in its area. Similarly, a firm will have interests in a CHP project on its site. While the project itself must be physically located within the UK, the host organisation may be foreign or multinational.

The investor and user may be identical - for example, if a company subject to a CCLA invests in an external project (e.g. methane recovery) with the aim of using the credit towards its CCLA target. Similarly, the investor and host may be identical - for example, where an industrial firm which is not subject to either the CCLAs or the cap & trade scheme invests in a CHP project on its own site, and sells the resulting credits to a company within the UKETS. It is even possible for the investor, host and user to be one and the same company - for example, a CCLA company could host a project on one of its sites, with the aim of reducing emissions from sources that lie *outside* the CCLA facility, and then use the credit to meet CCLA obligations.

System boundaries

Policy additionality is considered in terms of the physical circumstances of the project, and hence the policy influences on the host. For example, in the case of a CHP unit on an industrial site, the relevant policies are those directly influencing the host organisation (e.g. the CCL with exemptions for CHP fuel). In this case, the policies influencing the investor and user are not relevant, unless they are one and the same company as the host.

This picture is complicated however, when we consider the appropriate *system boundary* for the project. The issue here is the extent to which the project can be considered to be *separable* from the rest of the energy system. If it can (to a first approximation), then the system boundary can be roughly coincident with the project. For example, switching from coal to gas at an industrial site will have a minimal influence on the rest of the energy system. But in other cases, the project will have broader influences throughout the energy system. This is particularly case for electricity. For example, an efficient lighting program within the domestic sector generation will impact upon generation emissions throughout the ESI, as would a large scale wind farm or CHP installation. In these cases, estimation of the project baseline will require assessment of the impacts on the whole system, perhaps through the use of a system model.

These considerations are highly relevant to policy additionality. If the system boundary is at the *project level*, then the consideration of relevant policies can be confined to those affecting the host. If, however, the system boundary is at the *system* or *national* level, then a much broader range of policies becomes relevant. At a national level, the entire climate program becomes relevant to a discussion of additionality.

The discussion in this report will focus on the policies directly affecting the project host – i.e. it will assume a narrow system boundary. This is not to second-guess the final choice of system boundary for different types of project, but merely to keep the scope of the report within manageable bounds.

Leakage and double counting

Two important issues for emission reduction projects are leakage and double counting:

- *Leakage*: The emission reductions achieved by the project will be defined in relation to a system boundary. For example, a boiler conversion to gas will reduce emissions within an industrial site, where the latter defines the system boundary. But it is possible that emissions outside of the system boundary will increase as a direct or indirect result of the project's activities. This phenomenon is termed leakage (carbon leakage for CO_2). The causal chains leading to leakage can be complex, such as when the capital equipment used by the project has a high embodied energy.
- *Double counting*: The emission reductions created by the project will be used to generate a carbon credit. But there is a risk that the project will also be used to fulfil other regulatory obligations, such as counting towards increases in renewable energy capacity. Situations such as this can lead to the double counting of emission reductions.

Additionality, leakage and double counting are inter-linked. Problems of double counting already arise within the UKETS in relation to its interface with other schemes such as the Renewables Obligation. This is partly a consequence of the increasing complexity of UK climate policy. It is important to ensure that the project scheme does not compound this problem. Again, the future implementation of the EUETS is a critical issue. For example, projects in the ESI that generate credits may subsequently be brought under the umbrella of the EUETS and then be used to free up allowances.

2.5 Summary

This section has described the basic concepts of additionality and policy additionality, and provided a framework for classifying relevant climate policies. This framework will be used in the following five sections, which examine each of the priority sectors in turn. Each section will identify and classify those policies that require, fund, support or encourage carbon abatement in the sector. Those policies which are considered particularly important for policy additionality will be described in more detail, and the implications for additionality identified. Brief comments will also be made on the potential project types in each sector.

3. Policies in the built environment area

The built environment can be divided into: a) non-domestic buildings, which includes public, commercial, and industrial buildings; and b) domestic buildings, which includes houses and flats. The domestic sector is specifically *excluded* from the crediting scheme, so the discussion in this section will be confined to non-domestic buildings. Energy use in these buildings can be classified as either:

- energy use from installed equipment such as heating ventilation & air conditioning;
- energy use from non-installed equipment, such as computers.

The first is strongly influenced by the building envelope, while the latter is not. Table 3.1 illustrates that the non-domestic built environment (public, commercial & industrial buildings) accounts for 19.4% of UK CO2 emissions. This table: a) assigns ESI energy use to final users; b) includes energy use in both installed and non-installed equipment; and c) excludes energy use in industrial processes and process emissions (which accounts for the bulk of industrial energy use). Non-installed equipment accounts for around 20% of energy use in public and commercial buildings, which means that around 16% of UK CO_2 emissions are from the non-domestic built environment sector (including indirect emissions from electricity use).

Table 3.1 The contribution of buildings the UK carbon emissions

	% of final energy	**% of CO_2 emissions**	**% change final energy 1970-94**	**% change emissions 1970-94**
Public/commercial buildings	12.5	14.8	+12.8	-26.4
Industrial buildings	4.0	4.6	-52.7	-9.2
Total non-domestic buildings	*16.6*	*19.4*	*-15.9*	*-55.0*
Domestic buildings	28.8	27.4	+18.3	-25.5
Total buildings	**45.4**	**46.8**	**+2.3**	**-25.9**

3.1 Potential project types in the built environment area

Projects within this sector may be targeted at either the construction of new non-domestic buildings, or the refurbishment of existing buildings. The projects may affect the building envelope, the heating system, the ventilation/air conditioning system or a combination of the three. Similarly, the project may be focused on energy demand technologies (e.g. building envelope measures such as improved insulation); energy supply technologies (e.g. energy efficient condensing boilers; photovoltaic roof installations) or both. In each case, the project would be likely to involve designs/technologies which go beyond the typical or required performance of new/refurbished buildings. The latter defines the counterfactual baseline. Behavioural changes, such as improved housekeeping, are unlikely to be candidates for crediting projects although they are important for energy efficiency in the sector.

CHP projects may be an important source of potential credits in this sector, but the policies relevant to these are discussed separately in section 5.

3.2 Policy influences in the built environment area

Table 3.2 summarises the most important policy measures in the built environment area, using our standard classification system. The following sections discuss a selection of these policies, identifying their implications for the crediting scheme.

Table 3.2 Climate policy measures in the built environment sector

Broad category	Instrument type	Key instruments relevant to built environment sector
Education, information & moral suasion	Education, information & moral suasion	• Energy Efficiency Best Practice Program • Design Advice Scheme for new buildings
Voluntary approaches	Unilateral commitments	• Voluntary energy efficiency agreements (e.g. hotel sector) • Voluntary targets for the government estate and other public sector buildings
	Public voluntary schemes	• Making a Corporate Commitment Campaign • Adoption of environmental management systems
	Negotiated agreements	
Economic instruments	Charge systems	• Climate Change Levy
	Trading mechanisms	• Voluntary participants in UKETS cap and trade program
	Financial instruments	• Enhanced capital allowances for investment in qualifying energy efficient technologies (all sectors) (£100m) • Capital investment in public sector building/refurbishment projects, with energy efficiency guidelines • Support for PV installations
Command and control	Framework based standards	
	Performance based standards	• Revised building regulations Part L • EU directive on the energy performance of buildings
	Technology based standards	• Revised building regulations Part L

3.3 Voluntary energy efficiency agreements

Instrument description

The only example of a voluntary energy efficiency agreements at present is the 'Hospitable Climates' programme of the Hotel & Catering International Management Association (HCIMA). This was developed with the assistance of the EEBPp and came into being in November 2001. The government hopes that agreements in other sectors will follow, including higher education.

The overall target is to reduce carbon emissions from the hotels sector by 15% below 1999 levels by the end of 2010. Individual establishments choose to join the agreement by making a commitment to improve energy efficiency - but need not individually commit to the 15% target. The Association, in collaboration with the EEBPp, provides support in the form of benchmarking tools, information on energy efficiency opportunities, training materials, online discussion groups and a helpline.

Additionality issues

Refurbishment projects in the hotel sector (or in other sectors with comparable agreements) may generate credits as well as counting towards the agreement target. To the extent that the sector has already received support from the EEBPp, this may be viewed as a double reward. Alternatively, it may be viewed as a valuable additional incentive, helping to guarantee attainment of a non-binding voluntary target.

3.4 Voluntary targets for the government estate & other public sector buildings

Instrument description

Government initiatives for energy management on its own estate include introducing environmental management schemes, reporting and benchmarking initiatives and a 1% per annum improvement in performance against 1999-2000 levels over the period to 2010. Similar targets have been endorsed by local authority associations for non-domestic buildings owned by local authorities, but the implementation of this in individual authorities is uneven. There are parallel initiatives to improve energy efficiency in schools, higher and further education, the MoD, and the NHS, although in these cases there are no aggregate targets but merely estimates of the possible savings to 2010. A proportion of these savings is included in the estimated 0.5MtC/year savings from public sector buildings by 2010 given in the climate program. The saving is to be achieved through capital programmes, encouragement of improved energy management, reporting & benchmarking initiatives promotion of low energy design and so on.

Additionality issues

In developing individual projects in the sectors, a project baseline should reflect anticipated efficiency improvements (e.g. 1%/year in the government estate) as far as 2010. It is possible that the targets will be tightened post 2010, which may have implications for crediting lifetimes. Beyond this, there seems no good reason to restrict crediting in these sectors of the

grounds of existing voluntary targets. There may be implications for double counting in the climate program if emission reductions from the crediting initiative are counted separately to those from government targets.

3.5 Making a Corporate Commitment Campaign (MACC2)

Instrument description

Public and private sector organisations may become signatories to MACC2 to demonstrate their commitment to reducing GHG emissions. To register for MACC2, an organisation must publicly commit to specific improvement targets and report annually on progress. Aside from publicity, there is no additional public sector support, beyond that provided generally in the EEBPp and other information programmes.

Additionality issues

Membership of MACC2 should not restrict eligibility for project crediting, but individual project baselines may need to include the voluntary targets taken on under the scheme. There are no implications for the climate program as MACC2 is too small (and uncertain) to have aggregate reductions associated with it.

3.6 Climate Change Levy (CCL)

Instrument description

The CCL applies to coal, gas and electricity use in the public, commercial and manufacturing sectors. It does not apply to the transport and domestic sector, or to energy used by very small firms which are classified as domestic. Similarly, it does not apply to the upstream energy sector, which includes oil refineries, gas plants and electricity generators.

The CCL is a *downstream* energy tax, with electricity being taxed at the point of consumption. Fuel use for electricity generation is exempt. Oil products are also exempt, as they are already subject to excise duties. Firms in energy intensive sectors have entered into negotiated agreements (CCLAs) to give them exemption from 80% of the levy. These are discussed further in section 5.5.

The CCL will increase the unit price of electricity by 0.43p/kWh, and that of gas and coal by 0.15p/kWh - corresponding to 11% increase in the average (1999) price of industrial electricity and a 26% increase in the price of gas[2]. Using standard carbon contents, the fuel price increase corresponds to £30/tonne CO_2 for gas, £17.4/tonne for coal (direct emissions) and £25/tonne CO_2 for electricity (using an emission factor of 0.43 $kgCO_2$ per kWh of delivered electricity). Together with the exclusion of oil, these figures demonstrate the variance of the CCL from a straightforward carbon tax. Fuel used in CHP is exempt from the CCL, as is electricity purchased from certified renewable sources. Electricity from nuclear generators is not exempt, despite being carbon free

[2] This is unit prices and excludes standing charges. The percentage change will be greater for large sites as unit prices are lower. There have been large increases in UK gas prices since 1999, as a result of both increases in global oil prices and connection with the wider European market.

The CCL is expected to raise £1 billion in its first year, but most of this will be returned in the form of a 0.3% cut in employers' National Insurance contributions. Around £50 million will be kept for energy efficiency demonstration schemes, information programs and subsidised energy audits, while £100 million will be allocated for 100% first year 'enhanced capital allowances' (ECAs) for investments in specific energy efficient technologies. These are discussed further in section 3.8.

The CCL was introduced in April 2001 and currently there are no plans to increase the level of the tax before 2010. The CCL is anticipated to lead to a 2MtC reduction in CO_2 emissions 'including the exemption for CHP and renewables'. The meaning of the latter phrase is unclear, as CHP and renewables are also incentivised by a range of other government policies (sections 4 & 5). The ECAs for energy efficiency investment and the financial support for R&D are expected to contribute an additional 0.5MtC. The total figure of 2.5MtC/year corresponds to 5.8% of emissions from fuel use that is subject to the *full* rate of the CCL rate (i.e. excluding the CCL negotiated agreements, which are discussed further in section 5.5). The uncertainty surrounding this estimate is illustrated by the fact that it is 33% greater than an earlier estimate provided by the DETR, which was for a 30% *higher* CCL rate.

As with any tax, the ultimate environmental outcome of the CCL is uncertain and the assumptions made regarding price elasticities & other factors may subsequently prove to be incorrect. If emission reductions are less than expected, the government may consider increasing the CCL rate. This would be politically unpopular and would threaten the status of the negotiated agreements. A second factor creating uncertainty about the future of the CCL is the downstream treatment of electricity. This is potentially incompatible with the upstream treatment of electricity in the proposed EU emissions trading Directive (section 4.7), so the future implementation of the EU Directive could lead to modifications to the CCL.

Additionality issues

The great majority of non-domestic buildings are eligible for the CCL, although there are a number of exceptions (e.g. charities). The CCL provides a price incentive to improve the efficiency of heat and electricity use, but it provides no incentive for switching to low carbon fuels. Since energy accounts for only ~1% of costs in a typical non-domestic building, the price incentive is relatively small. While the CCL would improve the economics of energy efficiency investment, there is strong evidence to suggest that many cost effective investments in non-domestic buildings are neglected at current energy prices (Sorrell et al, 2000). Similarly, life cycle energy costs for new buildings are commonly neglected in favour of minimising capital costs (Sorrell et al, 2000). In general, price incentives are only one factor influencing investment in energy efficiency, so estimating the impact of the CCL on investment & behaviour is fraught with difficulty.

The CCL will need to be included in any calculations of the economics of an individual project in the non-domestic sector. If project baselines are to be used, incorporating assumptions about future energy use and emissions from a non-domestic building, the impact of the CCL will need to be included in the calculations.

Since CHP fuel and renewable electricity are exempt, the CCL provides an incentive to invest in CHP and to purchase electricity from renewable sources. Built environment CHP projects may potentially be eligible for crediting, and are discussed in the next section. But there would appear to be no grounds for awarding credits to electricity consumers who switch to renewable electricity.

3.7 Voluntary participants in UKETS cap and trade program

Instrument description

CO_2 emissions from groups of non-domestic buildings may be included in the UKETS cap and trade program. For example, both retail chains (Sainsburys, Somerfield) and hotel chains (Whitbread Hotels) are among the 46 organisations that have completed the first stage of entry into the scheme and will be bidding in the incentive auction. The proportion of these organisation's CO_2 emissions that are covered by the scheme will depend upon the contents of their respective 'source lists' - where sources are defined to include both direct emissions from fossil fuel combustion and indirect emissions from electricity consumption (DEFRA, 2001a). A proportion of emissions from buildings owned by the retail chains are already covered by CCLAs through the inclusion of on-site bakeries. This suggests that Sainsburys and Somerfield will have some emissions covered by the CCLAs, some by the cap & trade scheme and possibly (depending upon the source lists) some included in neither.

Additionality issues

Projects that affect emissions from sources that are covered by the cap & trade program are ineligible for crediting. This rule is simple to apply. But it may be the case that participants in the cap & trade program have sources which are not covered by the program and for which they may be interested in developing crediting projects. For example, retail chains may want to propose projects associated with transport and logistics (which are excluded from the cap & trade scheme). If this occurs, individual companies will be involved in more than one component of the UKETS. This, however, should have no influence on baseline or crediting rules.

3.8 Enhanced capital allowances (ECA) for investment in qualifying energy efficient technologies

Instrument description

The ECA scheme forms part of the climate change levy package, and has a budget of £100 million/year funded from CCL revenues. It represents a form of tax relief (on profits) to encourage investment in energy efficient technologies. The scheme builds on existing provisions, under which businesses may obtain tax relief, in the form of capital allowances, for their investment in machinery and plant. This relief is normally given at a rate of 25% a year on the reducing balance basis, which means that 95% of the cost is relieved in 8 years. Enhanced capital allowances enables businesses to take relief on the full cost in the first year. The benefit is an improved cash flow for the business in the year in which the investment is made, while having a neutral impact on overall tax revenue. ECAs have been used in the past for certain types of investment, but this is the first time that they have been introduced to support energy efficiency.

ECAs have been made available for investment in CHP, boilers, motors, variable speed drives, lighting, refrigeration, pipe insulation materials and thermal screens, provided they meet relevant, technology-specific energy efficiency criteria. The criteria are reviewed annually and other technologies may be added to this list in future. Suppliers of individual

technologies must apply to have their products certified. Investment in buildings and structures is excluded.

Additionality issues

Energy efficiency projects in the non-domestic building sector may be eligible for ECAs if they include one or more of the above technologies. It is possible that not all applicants will be able to obtain ECAs, as the program is limited by the total budget of £100 million/year. Access to ECAs will enhance the financial attractiveness of energy efficiency project to business, although it will not change the basic economics (capital costs versus savings in energy costs). It may therefore be a relevant factor to be taken into consideration when assessing project economics. Similarly, the availability or otherwise of ECAs may be a relevant factor when determining a counterfactual baseline for the overall emissions from one or more non-domestic buildings.

3.9 Capital investment in public sector building/refurbishment projects

Instrument description

Capital investment in new buildings and refurbishment is likely to be the major source of energy efficiency improvement in non-domestic buildings. These are not dedicated energy efficiency projects, but general new build/refurbishment in which different standards of energy efficiency are possible. In the public sector, such projects will increasingly be subject to guidelines and (non-binding) targets on energy efficiency performance. Current initiatives include: specific guidance on the energy efficiency of new schools; action to promote the use of low energy design principles in capital projects in higher education; development of guidance to ensure that energy efficiency is included in specifications for PFI projects; and tailoring environmental assessment tools for non-domestic buildings (i.e. the BREEAM software developed by the Building Research Establishment), specifically to projects in the NHS. At are more general level there is the generic guidance on Best Value and whole life costing for public sector capital projects and procurement.

Additionality issues

Capital projects in the public sector that go significantly beyond typical practice may wish to apply for credits. In this case, it may be necessary to assess whether and to what extent the existing general or sector specific guidance for such projects either requires or encourages this level of performance. For example, a specific BREEAM rating may be specified in the guidance for new NHS hospitals and this may go beyond the minimum standards required by the building regulations. While such standards are not mandatory, they may be relevant to the determination of the baseline. It may be reasonable to assume that the baseline performance of capital projects in the public sector should be higher than the minimum standards required by the building regulations. Against this, the guidelines for public sector capital projects are typically non-prescriptive and qualitative and vary widely between individual subsectors. Furthermore, the guidelines are frequently not applied (incentives to minimise capital cost tend to dominate).

3.10 Revised building regulations

Instrument description

New non-domestic buildings must conform to a wide range of regulations under the 1984 Building Act, including energy efficiency provisions (Part L). The regulations were amended in 2002 (DETR, 2000a) and allow for three broad methods for demonstrating compliance:

- *Elemental method:* This considers the performance of each aspect of the building individually. Areas addressed include: thermal performance of construction elements (U values); air leakage; windows; solar gain; heating system efficiency (boilers & CHP); heating controls; lighting; air conditioning systems; and so on. Minimum standards must been met in each area, although there is scope for limited trade-offs.
- *Whole building method*: This considers the overall performance of the building in terms of carbon intensity (kgC/m^2/year), and therefore allows for much greater flexibility in meeting the standards. Standards based on EEBPp publications are given for naturally ventilated, mechanically ventilated and air-conditioned office buildings. School buildings can comply if they conform to DfEE guidance on environmental design, while hospitals can comply if they conform with NHS Estates guidelines (DETR, 2000a). The method is not yet suitable for other types of buildings.
- *Carbon emissions calculation method:* This also considers the performance of the whole building, and can be applied to any building type. Designers must calculate the carbon emissions from the proposed building, and demonstrate that these are equal to or less than the carbon emissions from a reference building that meets the criteria of the elemental method. This requires the use of appropriate and certified software tools.

The regulations also extend to refurbishment ('material alteration') of non-domestic buildings, although here the requirements are less strict, less comprehensive, open to interpretation (e.g. 'reasonable provision'), and maybe varied depending upon individual circumstances (DETR, 2000a, p101).

The revised regulations come into force in 2002. They are expected to lead to a 25 to 30% reduction in carbon emissions from new non-domestic buildings, and a total reduction in carbon emissions from the non-domestic building stock of 0.31-0.32MtC/year by 2010 (approximately 1% of the non-domestic building total). However, DETR has also published proposals for future amendments of the energy efficiency provisions, which would come into force after different intervals of time, but generally before 2010 (DETR, 2000a). A tightening of the regulations before 2010 is therefore very likely.

Additionality issues

The regulations set a floor for the energy efficiency performance of new and refurbished non-domestic buildings. Individual projects that exceed these standards, may wish to use the difference as a basis for applying for carbon credits. The relevant question here is: do the building regulations provide an adequate baseline for crediting in the sector? There are grounds for questioning this. While the 2002 amendments go substantially beyond previous requirements on energy efficiency, the UK remains some distance behind other European countries in this area (although the disparity is more apparent for domestic buildings). Furthermore, the required carbon intensities under the whole building method are based on

'typical', rather than best practice values and are substantially higher than best practice in the sector (e.g. 7.1kgC/m^2/year for a new naturally ventilated office, compared to 2.3kgC/m^2/year for best practice). And, as indicated above, we may expect further tightening of the regulations before 2010.

If the current building regulations are considered to be too lax a basis for crediting, some additional guidelines will be required. These may prove difficult to establish, given the diversity of building types in the non-domestic sector. The whole building method is largely confined to offices at present, owing to inadequate data on carbon intensity for other building types. Establishing standard carbon intensity (kgC/m^2/year) benchmarks for the non-domestic buildings sector will be problematic.

3.11 EU Directive on the energy performance of buildings

Instrument description

The EU has proposed a Directive on the energy performance of buildings (CEC, 2000b). This covers both domestic and non-domestic buildings, but industrial buildings are excluded[3]. The Directive proposes the establishment of a general methodology for calculating the energy performance of buildings, which *may* include a carbon intensity indicator. The methodology will be used as a basis for establishing minimum energy performance standards for new buildings, which should be updated every five years to reflect technical progress. The level of these standards is left to the discretion of Member States, and are likely to be based upon existing national building regulations in the first instance. Hence, while the Directive may not lead to a tightening of standards in the short term, it has the advantage of a common methodology that will facilitate comparison between standards in different Member States, and hopefully encourage convergence of standards in the longer term.

The proposed Directive also includes:

- A requirement for new buildings with a surface area >1000 m^2 to investigate the technical and economic feasibility of installing renewable generation, CHP or heat pumps and to make the results available to stakeholders.
- Provisions to upgrade the energy performance of existing buildings which are undergoing renovation. This only applies to buildings with a surface area >1000 m^2 and where the cost of the renovation exceeds 25% of the insured value of the building. The upgrades must be technically feasible and have a payback rate <8 years.
- A requirement for energy performance certificates to be made available to buyers of tenants of buildings, when the building changes hands. These should include information on current standards, best practice and recommendations for the improvement of energy performance. Public buildings are required to display their certificates.

The Directive proposes that member States transpose the Directive into domestic legislation by December 2003. However, the Council of Ministers decided to allow Member States to delay transposition to 2004 and full certification until 2008 if they lacked resources to carry out energy audits. The final content and entry date of the Directive is therefore unclear.

[3] The directive uses the ambiguous term 'industrial sites'.

In short term, the Directive seems unlikely to tighten the UK building regulations for new domestic buildings, although a different approach may be required if a standardised methodology is adopted. Once in force, the Directive will require updates of the regulations every five years and may lead to UK standards being brought more in line with those in mainland Europe. The provisions on refurbishment go beyond current UK requirements, with the explicit reference to measures with an 8 year payback. Similarly, the requirements of renewables/CHP assessment for new buildings provides an additional incentive for these technologies, although much will depend upon how (and by who) 'economic feasibility' is interpreted (e.g. what rate of return is acceptable).

Additionality issues

For project crediting, the issues raised by the Directive are similar to those described for the UK building regulations. The standards required for new buildings and major refurbishment may be relevant to the development of project baselines in this sector. Similarly, the requirement to assess renewable & CHP potential is relevant to the additionality of renewables and CHP projects in new buildings.

3.12 Summary: policy additionality for built environment projects

Table 3.3 summarises the sectoral coverage of the policies discussed in this section. In terms of defining additionality, the most important policies are the Building Regulations and the Climate Change Levy, since these are mandatory. The former *requires* certain minimum standards to be achieved, while the latter provides an *incentive* for energy efficiency investment by improving the rate of return. The ECAs do not change the basic economics of an energy efficiency investment, but do make it more attractive by improving organisational cash flow.

Most of the remaining policies are performance guidelines or voluntary targets taken on by an organisation or a sector. The relevance of these to additionality is much less clear.

Table 3.3 Scope of particularly relevant policies in the built environment sector

Policy	Year	Public	Commercial	Industrial	Notes
Voluntary energy efficiency agreements	2001		✓		Only applies to hotel sector at present. Scope for expansion
Voluntary targets for public sector buildings	To 2010	✓			Stringency varies between individual subsectors
Making a Corporate Commitment Campaign 2	2000	✓	✓	✓	Open to organisations in each sector, but limited take-up at present
Climate Change Levy	2001	✓	✓	✓	Exemptions for oil, renewables & CHP fuel. Some industrial buildings may fall within CCLAs
Voluntary participation in the UKETS cap & trade programme	2002		✓	✓	Some organisations have joined
Enhanced capital allowances for energy efficiency investment	2001	✓	✓	✓	Specific energy efficient technologies eligible
Capital investment in public sector building/refurbishment projects	Varies	✓			Both general and sector specific guidelines & targets
Revised building regulations	2002	✓	✓	✓	Regulates energy performance of new and refurbished buildings, but standards are stricter for the former
EU Directive on the energy performance of buildings	2004	✓	✓	✓	Unlikely to lead to immediate changes to UK regulations

4. Policies in the electricity generation area

Electricity generation occupies a critical position in any carbon emissions trading scheme. Table 4.1 estimates CO_2 emissions from electricity generation in 1999 to be 45.5MtC, or approximately 30% of total UK CO2 emissions.

Table 4.1 The contribution of electricity generation to UK carbon emissions

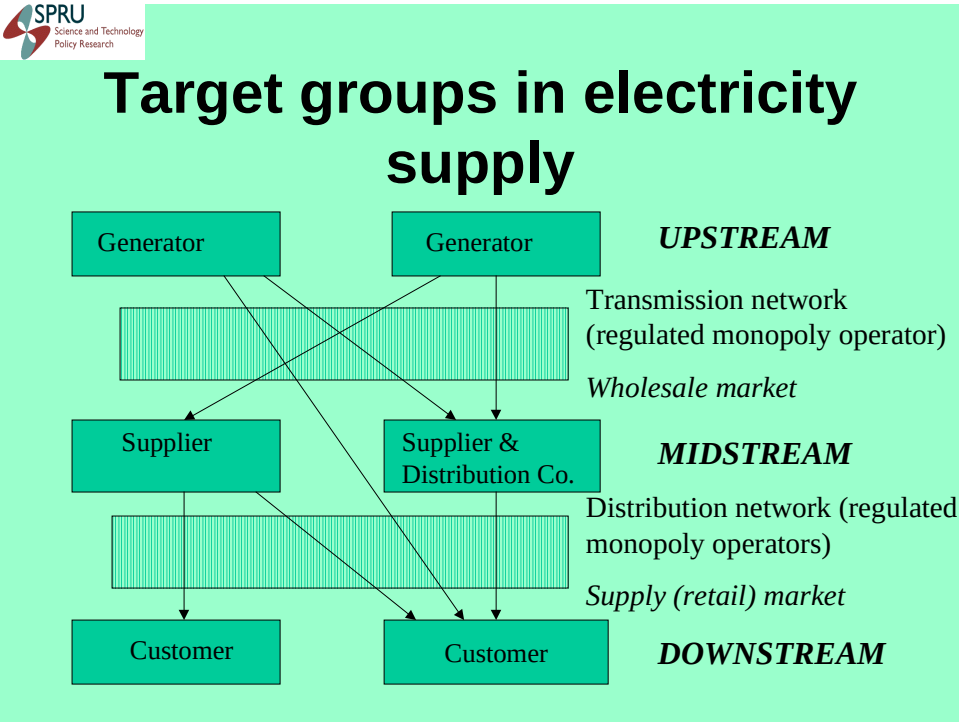
	Elec Gen (TWh)	**Emission factor MtC/TWh**	**Carbon emissions MtC**
Renewables	10.2	0	0
Nuclear	96.3	0	0
Gas	141.4	0.11	15.6
Coal	106.1	0.27	28.7
Oil	5.6	0.22	1.2
Total/av	**359.5**	**0.13**	**45.5**

Source: Based on DTI (2000).

In the UK climate program, these emissions are commonly attributed to the end user of the electricity. The alternative convention is to attribute generation emissions to the electricity supply industry (ESI), and to assign only direct combustion emissions (from boilers etc.) to industry, commerce and other consumers of electricity. This upstream/downstream treatment is not merely an accounting convention. It also relates to the treatment of electricity within climate policy. For example, the EUETS will require generators to obtain allowances to cover all their carbon emissions – i.e. the generators take responsibility for ESI emissions. In contrast, the UKETS assigned allowances to industrial electricity consumers that cover both direct emissions from fossil fuel combustion, and indirect emissions from electricity consumption. In this case, the consumer takes responsibility for ESI emissions. The incompatibility between these two approaches is one of the biggest issues within UK climate policy.

The electricity market is complex, involving the activities of generation, high-voltage transmission, low voltage distribution and retail/supply (where the latter involves purchasing electricity on the wholesale market and selling to consumers). This market is fully liberalised, with competition at the wholesale and retail level, and with a wide range of companies being involved in different aspects of the supply chain. Climate policy relevant to ESI emissions may correspondingly affect a number of actors at different points on this chain (Figure 4.1).

Figure 4.1 Target groups in the electricity supply industry



4.1 Potential project types in the electricity generation area

There are a range of approaches to reducing emissions from the ESI:

- *Reduce electricity demand*: Aggregate demand depends upon electricity prices and the actions of millions of electricity consumers. The generators influence on demand is indirect, via prices. In a liberalised electricity market, generating companies seek to expand market share and have an interest in increasing aggregate electricity demand.
- *Reduce losses in transmission or distribution:* This may result from improvement in the physical network, or from locating the generator closer to the end consumer and supplying electricity at a lower voltage level. The latter is commonly termed embedded generation.
- *Improve the efficiency of electricity generation:* Individual generating plant may improve efficiency, or more efficient plant may substitute for less efficient plant.
- *Use lower carbon fuels:* The primary example is the displacement of coal-fired generation by gas fired CCGTs. Alternatively, there may be scope for co-firing gas at existing coal-fired stations.
- *Use renewable generation:* Displacement of fossil output by renewable electricity. This should be zero carbon, but activities that emit CO_2, such as energy from waste, may count as renewables in the UK. The UK has a target for 10% of electricity from renewable sources by 2010.
- *Use nuclear generation:* Around one quarter of UK electricity is generated from nuclear plant, with zero carbon emissions. The economics of new nuclear plant is very poor, and

much existing nuclear plant is due for retiral. However, life extension or efficiency improvement of existing plant is a possible abatement option.

The relevant question is which type of project should qualify for crediting in this area? Projects that reduce electricity demand are best considered under other headings, such as the built environment. Any such project will require assumptions about the carbon intensity of the ESI when calculating the corresponding emission reductions. If fixed conversion factors are used, the assumed emission reduction is likely to differ from the actual emission reduction, and the degree of *disparity* is likely to increase over time as the fuel mix in the ESI changes.

Projects that reduce electricity demand are already incentivised by the CCL, the CCLAs the cap & trade component of the UKETS and a host of other policies. In contrast, supply side projects that improve the efficiency of generation, use lower carbon fuels or use renewables are *not* incentivised by these instruments. Similarly, these instruments do not provide any direct incentive to improve the efficiency of transmission or distribution systems. So it is for these type of projects that project crediting arrangements could prove valuable.

4.2 Policy influences in the electricity generation sector

Policies relevant to electricity generators fall into two categories. First, there are those policies which *directly* affect generation plant, such as IPPC regulations on large combustion plant. Secondly, there are those policies which *indirectly* affect electricity generators, by changing the demand for electricity. This includes the aggregate demand, the time profile of demand (baseload/peak), or the demand for specific sources of electricity, most notably renewables. A very wide range of policies fall into this second category, including the CCL and the Renewables Obligation. In the case of the latter, the obligation to purchase renewable electricity is placed upon electricity suppliers, but this creates a corresponding incentive to invest in renewable generation.

Since electricity is normally fed into the national transmission network (or local distribution networks) rather than being dedicated to individual consumers, aggregate changes in national electricity demand will influence the economics of individual generation plant. Similarly, increases in output from one generating plant may lead to decreases in output from another plant elsewhere in the country, with corresponding changes in emissions. These considerations suggest that the system boundary issue is particularly problematic for electricity generation projects.

The wide range of policies that indirectly affect generators by changing electricity demand will not be discussed here. Instead, the focus will be on:

- measures that directly affect existing and planned generation plant; and
- measure that directly and indirectly encourage renewable electricity.

Those policies that are particularly important are:

- the Renewables Obligation,
- the New Electricity Trading Arrangements;
- the Integrated Pollution Prevention & Control (IPPC) Directive;

- the proposed EU Emissions Trading Directive;

Table 4.2 classifies these and other policy measures, using our standard system. The following sections discuss a selection of these policies, identifying their implications for the crediting scheme. The IPPC Directive and the EUETS are introduced here, but these policies are equally relevant to CHP projects and methane recovery projects which are discussed in sections 5 & and 6.

Table 4.2 Climate policy measures in the electricity generation area

Broad category	Instrument type	Key policy instruments relevant to electricity generation
Education, information & moral suasion	Education, information & moral suasion	• Energy Efficiency Best Practice Program
Voluntary approaches	Unilateral commitments	
	Public voluntary schemes	• Making a Corporate Commitment Campaign • Adoption of environmental management systems
	Negotiated agreements	
Economic instruments	Charge systems	• CCL exemptions for renewable electricity
	Trading mechanisms	• Proposed EU emissions trading directive • Renewables Obligation
	Financial instruments	• New Electricity Trading Arrangements • Capital grants for offshore wind and energy crops
Command and control	Framework based standards	• IPPC Directive
	Performance based standards	• Large Combustion Plant Directive
	Technology based standards	•

4.3 The Renewables Obligation

The Renewables Obligation places a statutory requirement on all suppliers of electricity to demonstrate that a set percentage of their electricity sales has, effectively, come from a renewable source. This is the key government policy instrument for supporting the market penetration of renewables technologies. It replaces the Non-Fossil Fuel Obligation (NFFO) scheme.

Instrument description

Timing and Objectives

The Renewables Obligation will come into effect in April 2002.[4] The initial Obligation will run for ten years, and sets percentage targets for renewable electricity supply that increase annually (Table 4.3).

Table 4.3 The Renewables Obligation targets.

Period	Estimated sales by suppliers	Estimated total obligation	Total obligation as % of electricity sales
	TWh	TWh	%
2001/02	310.9	-	-
2002/03	313.6	9.4	3.0
2003/04	316.2	13.5	4.3
2004/05	318.7	15.6	4.9
2005/06	320.6	17.7	5.5
2006/07	321.4	21.5	6.7
2007/08	322.2	25.4	7.9
2008/09	323.0	29.4	9.1
2009/10	323.8	31.5	9.7
2010/11	324.3	33.6	10.4
2011/12 to 2026/27	-	-	10.4

Source: DTI (2001, p.23)

Target groups

The primary target group is suppliers (retailers) of electricity. However, the obligations placed on them are intended to help support generators of renewable electricity. The DTI has specified which technologies it considers to be eligible sources of renewable electricity for meeting supplier targets.

Operation

There are three ways an electricity supplier can comply with their obligation:

- Invest in renewable electricity generating capacity.
- Buy Renewables Obligation Certificates (ROCs) from other renewables generators.
- Pay a Buyout Price (effectively a fine). The Buyout Price will be set initially at £30/MWh (i.e. around €48/MWh) and will be index linked. Revenues from suppliers paying the Buyout Price will be recycled to suppliers that are in compliance in proportion to the quantity of renewable power they have purchased ('smearback'). Use of the buyout prince thereby creates an effective subsidy to competitors.

[4] The draft Statutory Instrument can be found on the web at:http://www.hmso.gov.uk/si/si2002/draft/20029337.htm

While the Renewables Obligation requires a certain volume of renewable electricity, the cost of meeting this target is capped by the buyout price. If suppliers choose to pay the buyout price, the aggregate target may not been met.

Sales of ROCs can be separate to the sale of electricity. The plan is for a market in ROCs to develop. Revenues from this ROC market will help renewables generators towards the income they need (over and above the market price of electricity) in order to be viable.

The government has specified which types of renewable project are eligible to receive ROCs. Generators with the following technologies will receive a ROC for every 1 MWh of electricity they generate:

- Landfill gas;
- Sewage gas;
- Energy from waste – only non-fossil derived energy;
- Hydro – all small hydro (i.e. <20MW DNC) and only large hydro commissioned after 2001 (i.e. >20MW DNC);
- Onshore wind;
- Offshore wind;
- Biomass (with certain date and type restrictions);
- Geothermal power;
- Tidal and tidal stream power;
- Wave power;
- Photovoltaics;
- Energy crops.

Thus any projects falling into the above categories will be eligible for ROCs under this policy instrument.

Additionality issues

The Renewables Obligation encourages renewables projects, but does not require baseline setting. However, the policy creates an effective business as usual baseline for the aggregate development of renewables in the UK over the next ten years. It is only if *all* suppliers have met their targets at the end of the compliance period that an individual renewables project can be considered additional to the UK business as usual. Also, the aggregate target is increased yearly until 2010. At present, the government has made no commitment to a renewables target beyond 2010, but following the recent Cabinet Office Energy Review (PIU, 2002), it is very likely that a 20% target will be set for 2020.

Renewables project developers can receive revenues from the ROC market to support their project. Moreover, the government has stated that it will allow individual suppliers who *over-comply* with their Renewables Obligation to convert that over-compliance into carbon credits for sale into the Emissions Trading Scheme (ETS) (DEFRA, 2001, p.38). Note that they may do this even if suppliers as a whole have not met their targets – i.e. even if the UK has less renewable capacity than required in the Obligation. The baseline for this credit creation is therefore at the supplier level, not the project or UK level.

In making this conversion, the same standard conversion factor as used for Climate Change Levy Agreements will be used. Suppliers can convert each kWh over-compliance to 0.43kg CO_2 mitigated. How the certificates will be issued remains unclear. It is of vital importance in cases where the supplier is over-complying due to direct investment in renewable generating capacity of their own. Clear certification rules are required which prevent the over-complying capacity from creating both ROCs and carbon credits. If this dual certification of over-compliance benefits arose it will create double counting problems.

The ROCs can be sold to other electricity suppliers (without their own renewables capacity) to help them meet their compliance target under the Renewables Obligation scheme, and hence contribute to the overall GHG mitigation expected from the Renewables Obligation scheme. At the same time, under this dual certification scenario, the same over-compliance would be creating carbon certificates for sale into the ETS – where the GHG mitigation from over-compliance would again be counted, but this time to offset carbon emissions by the certificate purchaser. GHG mitigation will then be counted twice and the project developer (electricity supplier) receives two income streams by over-complying. In order to avoid such double counting, over-complying renewables capacity should be issued either ROCS or carbon certificates but not both for the same MWh.

The above suggests that qualifying renewables projects can earn ROCs, and in some cases can earn carbon credits as well, but not both for the same MWh. The process by which the latter are created is different from the arrangements under the project scheme and relies on a supplier baseline rather than a project baseline or a UK aggregate baseline. This means that qualifying renewables projects are unlikely to be candidates for the creation of separate project credits under the project scheme, as this would merely compound the problems of double counting.

One possible exception to this could be if a developer decided that project credits offered a more profitable revenue stream than ROCs. The economics of renewable generation makes this unlikely - for example, the buyout price corresponds to approximately £70/t CO_2 which is likely to be higher than the anticipated price of carbon credits. But the fact that this is unlikely, should not mean that it is ruled out in principle. This means that a decision needs to be made on the potential eligibility of all types of renewables projects.

If this route was chosen, the system boundary for the baseline becomes an issue. For example, should a renewables project be awarded credits when the UK as a whole has less renewables capacity than required under the Obligation? And what would happen if, subsequent to a renewables project being awarded credits, the UK renewables target was tightened? These questions go beyond the project crediting scheme and have implications for UK energy policy as a whole. They therefore need to be resolved in discussion with the DTI and other relevant parties.

4.4 Capital grants support for renewables

Instrument description

The government has announced financial support towards the capital costs of some types of renewable project. The whole capital grants funding system is evolving and still taking shape. Three types of renewable technology will receive funding: offshore wind; energy crops; and

photovoltaics. The precise totals for grants going to each technology is confused. A survey in 2001 suggested support would amount to £250 million over the next three years, including:

- £100m for wind, solar and wave power announced by Tony Blair in March 2001;
- £50m from National Lottery funds, mainly for offshore wind and energy crops;
- £55.5m for the Government's renewable energy research and development programme from the DTI;
- £39m support for offshore wind announced by Tony Blair in October 2000 from the DTI; and
- £12m in grants for planting energy crops from DEFRA (Hertin et al, 2001, p.4).

Photovoltaic plans are least developed, but discussions seem to suggest 50 per cent capital grants will be available for some roof-top photovoltaic systems in public, commercial and domestic buildings.

Details of support for *offshore wind* projects are more developed. A total of £39 million is currently available from the DTI.[5] At least another £10 million will be available through the New Opportunities Fund scheme for redistributing Lottery money. This money will be used to fund 40 per cent of eligible costs (with a £10 million limit) on selected projects. There will be three application rounds. The first deadline for applications was January 2002. The second will be December 2002, and the third deadline is June 2003.

Energy crop projects will be able to bid for £33 million capital grants under the New Opportunities Fund. The New Opportunities Funds also has £10 million to help fund small-scale biomass/CHP projects. New Opportunities Funds must be committed to projects by 2005.[6]

Additionality issues

Renewables projects in the above categories may therefore be able to obtain direct subsidy from the government. In addition, all projects will contribute to the government's Renewable Obligation targets and hence will be eligible for ROCs as described above. These two reinforcing sources of policy encouragement make such projects unlikely candidates for carbon crediting.

4.5 The New Electricity Trading Arrangements

The New Electricity Trading Arrangements (NETA) were introduced in 2001, and replace the previous arrangements under the Pool. In principle, NETA should have a neutral impact on the carbon intensity of generation, but in practice they have had a negative impact. The reasons for this will be briefly identified below.

Instrument description

Under NETA, electricity trading is placed upon bilateral contract between generators, suppliers, traders and customers. There are three elements:

[5] See http://www.dti.gov.uk/renew/eoi.htm
[6] See http://www.nof.org.uk/index.cfm?loc=env&inc=energy

- The majority of electricity is traded on forward and futures markets, which allow contracts to be struck up to several years ahead.
- Small volumes of electricity are traded via short-term power exchanges, which give participants the opportunity to fine-tune their contract positions.
- A balancing mechanism is used to ensure that supply and demand is balanced in real-time.

To assess the likely physical balance on the system, the system operator (SO) asks participants to notify their expected generation & metered demand for each half-hour trading period (Participants here include generators, suppliers and customers). The SO then accepts bids for and offers of electricity to ensure that the system is balanced. The position of all participants is assessed to determine whether there metered output or consumption of electricity matches their contracted position. If not, they will be 'out of balance' and will either receive lower prices for their electricity or incur costs.

Existing renewables generators have reported problems arising from NETA (Bathurst and Strbac, 2001). The balancing mechanism under NETA penalises generators who do not honour their advance contract commitments. NETA participants who wish to avoid such exposure must know with a high degree of certainty the amount of electricity they will be producing in the future and that this is in balance with the electricity they have contracted to supply for every half hour period. Given the stochastic nature of many renewable sources of energy, especially wind, it is difficult for renewables generators to predict their output with precision. The same applies to certain types of CHP plant, where demand is uncertain. This disadvantages intermittent renewables & CHP operators under NETA. However, in introducing NETA a number of measures were put in place to assist such generators:

1. They could contract directly with local suppliers, thereby by-passing NETA arrangements and penalties.
2. They could consolidate any imbalance between their contracted position and electricity generated with the imbalances of other generators – the assumption being that some would be in surplus and others in deficit such that their consolidated imbalance was less than any individual imbalance.
3. They could trade into the Balancing Mechanism.

OFGEM have been monitoring the impact of NETA on smaller generators (including renewables) following a request from the Energy Secretary in February. OFGEM reported to the DTI at the end of August (OFGEM, 2001). OFGEM found that:

- very few small generators have joined the Balancing Mechanism;
- utilisation of consolidation measures has been very small and the measures on offer are perceived by small generators to be unsatisfactory;
- earnings were down considerably compared to last year (down 26% for renewables - 27% for wind); and
- the output of smaller generators has fallen substantially on last year (down 7% for renewables - 13% for wind).

OFGEM concludes "it is too soon to say whether smaller generators generally are more adversely affected than larger ones"(OFGEM, 2001, p.17). However, elsewhere OFGEM

recommends: “With lower prices for green energy, as for all energy, the Government may need to review whether targets can be met within current levels of subsidy and, in particular, the need for additional Government support for less reliable green energy”. (OFGEM, 2001b)

OFGEM’s views on NETA may be too sanguine. Many industry observers consider that there is sufficient evidence that NETA is disadvantaging renewables and undermining their position in electricity markets. Certainly NETA was not set up to provide a positive boost to renewables capacity, which is intended to come from the Renewables Obligation. If NETA is undermining the incentives for renewables generation offered by the RO, as now seems probable, NETA may need to be revised.

Additionality issues

The impact of NETA on the economics of intermittent generation will need to be considered when developing baselines. Possible revisions to the current framework should also be taken into account. In practice, NETA is one of three factors inhibiting the growth of renewables in the UK and threatening achievement of the 10% target under the renewables obligation. The other factors are the difficulty many renewables face in obtaining *planning permission* (particularly wind power) and the inadequate rewards for *embedded generation* in the pricing and regulation of electricity networks. These issues are discussed more fully in Ekins et al (2001).

4.6 Integrated pollution prevention and control

The Pollution Prevention and Control regulations implement the 1996 Integrated Pollution Prevention and Control Directive (IPPC) and largely replace the Integrated Pollution Control (IPC) Regulations from 1996. Their primary purpose of IPPC is to require the use of the Best Available Techniques (BAT) to prevent and control pollution from specified types of industrial installation. Large Combustion Plant (LCP), defined as combustion plant with a thermal input greater than 50MW, are amongst the regulated installations. All UK power stations fall into this category.

The IPPC regulations require installations to use energy efficiently. It is in this sense that IPPC may require operators to improve the operational efficiency of power stations. IPPC is thus highly relevant to projects at existing and new UK power stations as well as projects in a wide range of other industrial sectors (Table 4.4).

Instrument description

The IPPC regulations are currently being phased in sector by sector, as indicated in Table 4.4. Power stations will come under the IPPC regulatory ambit in 2006. They are already regulated under IPC. Although IPC does not have the specific energy efficiency requirement of IPPC, it does require the use of similar BAT criteria to prevent and control pollution.

Table 4.4 Proposed introduction of IPPC installations

Sector	2000	2001	2002	2003	2004	2005	2006	2007
Paper/pulp	*							
Steel	*							
Textiles	*							
Tanneries	*							
Cement & lime	*							
Ferrous metals		*						
Non-ferrous		*						
Glass		*						
Chloralkali		*						
Foundries			*					
Organics			*					
Food and milk			*					
Poultry				*				
Asbestos				*				
Ceramics				*				
Polymers				*				
Inorganics				*				
Slaughterhouses				*				
Metal surfaces				*				
Landfills				*				
Pigs					*			
Incineration					*			
Waste recovery					*			
Batch organics						*		
Gas/liquification						*		
Coating activity							*	
Speciality chems							*	
Refineries							*	
Large combustion plant							*	
Coal liquefaction								*

Note: Relates to installations requiring Part A1 permits only.
Source: DETR (1999, pp.20-21)

IPPC requires operators of installations to apply for an permit to operate their plant. The application must demonstrate that the operator is pursuing BAT standards relevant to their circumstances. The permit will set conditions of operation for the installation. These conditions are based upon the application information and subsequent negotiations between the regulator and installation operator. Determining BAT projects for each power station is devolved to negotiations between the individual pollution inspector (at the Environment Agency) and the operator of the power station (Smith, 1997; Fineman, 1998; Sorrell, 2002). It is feasible that projects to improve generating efficiency, or even switch fuels, could be topics of negotiation.

It is important to note that IPPC does not regulate CO_2 directly. Instead, energy efficiency forms one of the general obligations on operators (Article 3), and represents one of the considerations to be taken into account when determining BAT (Annex IV). CO_2 is *not* listed in Annex III as one of the substances for which emission limit values are particularly applicable (Article 2(6)). In addition, the Article 3 requirements are ambiguous. The first

paragraph requires authorities to 'ensure that installations are operated in such a way that.... energy is used efficiently'. But the second paragraph weakens this by stating '...it shall be sufficient if Member States ensure that the competent authorities take account of the general principles set out in this Article....'. A strict interpretation could be that the Article requires standards for the amount of energy used, while a loose interpretation merely requires authorities to ensure that pollution abatement does not lead to excessive energy use. This ambiguity in IPPC requirements creates some leeway in combining IPPC with carbon emissions trading schemes.

In contrast to CO2, the other five GHGs *are* regulated directly under IPPC and hence are subject to strict BAT requirements. At least three of the gases have a broader range of environmental effects, including local air pollution, which means that site specific determinations of BAT are more important. In addition, while control of CO_2 requires the improvement of energy efficiency throughout the installation, control of the other five gases is typically linked much more closely to individual processes. This should make it much easier to specify BAT for these gases than for CO_2. A consequence of this is that it is more difficult to include these other gases in an emissions trading scheme.

In interpreting IPPC requirements, regulators can refer to BAT Reference Documents (called BREF Notes) that have been developed by the European Commission's IPPC Bureau in Sevilla, Spain. The production of BREFs is ongoing and aimed at disseminating good practice and technology performance data rather than setting BAT standards. The draft BREF for large combustion plant has specific sections discussing energy efficiency and fuel switching options to reduce GHG emissions.[7] BREFS can inform negotiations between regulator and regulated, but the final decision is in the hands of the site regulator (i.e. IPPC is site-specific). Permit conditions may include projects to improve the energy efficiency of electricity generation or other operations relating to the large combustion plant installation.

Additionality issues

Clearly, IPPC has the potential to drive energy efficiency improvements in large combustion plant such as power stations. As such, it must be considered in any baseline or additionality guidelines for projects affecting LCP in the electricity generation sector. For example, the great majority of the projects identified by Mott MacDonald (2001) in a recent study of the electricity generation sector relate to highly cost effective efficiency improvements within existing power stations. An important question here is what proportion of these projects should be considered as being required (business as usual) under IPPC. The requirements imposed under the previous IPC regime are not necessarily a guide here, as unlike IPPC this did not have any requirements on energy efficiency.

The Environment Agency has recently produced a 'Horizontal Guidance Note' setting out general guidelines for the interpretation of energy efficiency requirements under IPPC (Environment Agency, 2001). This indicates that the Agency will not be using emission limits for energy efficiency, but will instead be seeking 'equivalent technical measures'. Under this guidance, all UK IPPC all installations will be required to meet 'basic energy requirements', which are not intended to be stringent. Installations will be expected to go beyond these basic requirements, but in two different ways:

[7] The draft BREF can be found at: http://eippcb.jrc.es/pages/Fmembers.htm

- Those installations that are participating in a CCLA (section 5.5) or in the cap & trade part of the UKETS will not have to demonstrate any further energy efficiency measures under IPPC. This is because it is assumed that the incentives and penalties created by the CCLAs & UKETS will themselves deliver such further measures.
- Those installations *not* participating in the other policy instrument will be required to pursue further permit-specific energy efficiency requirements, negotiated with the Environment Agency Inspector. Power stations fall into this second category as they are not covered by the CCLAs or the UKETS.

The economic criteria proposed by the Agency for determining these permit specific measures are vague:

> 'The assessment of BAT should not be constrained by whether pollution control techniques result in a net cost saving over their life of operation. It is perfectly valid to consider techniques which result in a positive annual cost. One would expect to spend money to reduce other pollutants and it is reasonable to expect, if necessary, to spend money to reduce pollutants from energy use.
>
> However, there is insufficient data at present to confirm an appropriate figure for the net cost up to which it would be reasonable to implement energy efficiency measures. The Regulators therefore intend to review the setting of an appropriate cost benchmark in the future, in the light of information arising from the Government's Climate Change Agreements and Emissions Trading mechanisms. At present there are ample measures that can be taken in most sectors if a benchmark of zero cost is used to determine which techniques should be implemented.' (Environment Agency, 2000: 30)

As described in section 5.5, if this guidance is to accord with government policy on CCLAs, then payback periods in the region of two to four years will be deemed suitable criteria for determining technical measures (even though the Agency, in principle, believes companies should be prepared to pay a positive net present value for some energy efficiency activities). The interpretation of the IPPC energy efficiency requirements thus hinges on: a) the future evolution of guidance from the Agency; and b) the manner in which this guidance is interpreted by individual Agency inspectors for particular installations. As a result, there is considerable uncertainty over whether energy efficiency projects at power stations (such as the bulk of those identified by Mott MacDonald) will be eligible for project crediting.

This situation is complicated further by the fact that power stations are proposed to be brought within the EUETS (described in section 4.7). In developing this Directive, the Commission has recognised that there are potential conflicts between emissions trading and the energy efficiency requirements under IPPC. In a recent 'non-paper' (CEC, 2002) on the interpretation of IPPC, it clarified that the energy efficiency requirements should only provide a 'baseline', or 'bottom line standard', thereby giving scope for installations to participate in carbon trading. The Commission's interpretation of the energy efficiency requirements therefore parallels that of the Environment Agency, although it still leaves open how 'baseline' will be interpreted. However, there is an important difference. At present in the UK, power stations are regulated by IPPC but not by the UKETS, and hence have to fulfil the Agency's *permit-specific* requirements. If and when the generators are brought into an EU wide trading scheme, the power stations will only have to fulfil *baseline* requirements. Whether and when this transition will take place is subject to much uncertainty.

In summary, crediting projects that improve the energy efficiency of power stations are subject to two key uncertainties:

- Whether these measures would have been required anyway under the permit-specific energy efficiency requirements of IPPC; and
- Whether the power station will subsequently enter the EUETS, and hence: i) require allowances for its CO_2 emissions; and ii) be subject solely to 'baseline' energy efficiency requirements under IPPC

The importance of the energy efficiency requirements will depend upon the guidance and interpretation made by the European Commission, the UK Environment Agency and individual Agency Inspectors. The importance of the EUETS goes much wider. This is the topic of the next section.

4.7 The EU emissions trading scheme

The proposed EU emissions trading directive (CEC, 2001) is of fundamental importance to both the project crediting scheme and broader UK climate policy. This is because there are serious incompatibilities between the EU proposals and the existing UK framework - notably the CCL, CCLAs and UKETS. The following summarise the key feature of the Directive, and then highlights some implications.

Instrument description

Timing

The proposed Directive defines the core elements of a common EU trading scheme, which will begin operation in 2005. But many of the design details are left to either subsequent EU regulations, or to the discretion of individual Member States. Also, delays and changes are likely before the Directive becomes law, which leaves considerable uncertainty over both the timing and the eventual shape of the scheme. The Directive proposes a split between a looser scheme for the period 2005-2008, with significant subsidiarity, and a post-2008 scheme that is significantly more harmonised.

Scope

The EU proposal is for a downstream cap & trade scheme targeted on major energy users. *The generators will be included in the scheme via an upstream treatment of electricity* – i.e. generators will need to obtain allowances for the fuel that they use.

The Directive applies to *installations*. This is based on IPPC definitions, but includes some sites *not* covered by IPCC (e.g. combustion plant of 20-50MW thermal input), and excludes some sites that *are* covered by IPPC (e.g. chemicals sector & waste incineration). The sectoral coverage is summarised in Table 4.5.

Table 4.5 Sectoral coverage of the EUETS Directive

Sector	Activities
Energy	Combustion plant >20MW, excluding waste incineration
	Oil refineries
	Coke ovens
Ferrous metals	Metal ore roasting or sintering
	Iron & steel production (including casting) with capacity >2.5tonnes/hr
Mineral	Cement production in kilns with capacity >500t/day
	Lime production in kilns with capacity >500t/day
	Glass & glass fibre production with melting capacity > 20t/day
	Ceramic production with capacity > 75t/day, or kiln capacity >4m^3
Other	Pulp from timber production
	Paper & board with production > 20t/day

Participation is mandatory in the current draft. Earlier drafts allowed for the exclusion of certain installations provided they made 'equivalent effort'. This was specifically included to allow for national initiatives such as the UKETS, but has now been dropped. This point is the subject of controversy and opposition – not least from the UK.

Objectives

The Directive is confined to CO_2 in the pre-2008 phase on the grounds of monitoring uncertainties for other GHGs. Inclusion of other GHGs will require an amendment.

The Directive does *not* include a quantitative targets for GHG emissions reduction. Decisions on the *total quantity* of allowances to be issued are left to individual Member States. This is subject to the criteria set out in Annex III on national allocation plans. This includes consistency with:

- Member State obligations, under the Kyoto Protocol;
- the technological potential of installations to reduce emissions;
- assessments of actual and projected progress towards fulfilling Community commitments; and
- other EU legislative and policy instruments.

The last includes a requirement that no allowances should be allocated to cover emissions which would be reduced or eliminated as a consequence of EU legislation on renewables. Account should also be taken of unavoidable increases in emissions resulting from new legislative requirements.

The total quantity of allowances should ensure that the overall emissions of all the participating installations collectively would not be higher than if the emissions were to be regulated under IPPC (Article 13). For non-CO_2 GHG gases this means an aggregate level of emissions related to BAT (trading means some installations will under-comply with BAT while others can over-comply). For CO_2 the situation is more ambiguous since BAT does not apply under the IPPC Directive (section 4.6).

Operation
Eligible installations are obliged to obtain a GHG emissions *permit.* This imposes a range of requirements, including the requirement to surrender a sufficient no. of GHG *allowances* each year to cover actual emissions of CO_2. The GHG permit must be co-ordinated with authorisations under IPPC.

Allowances are freely tradable within the EU, and are only valid for the *period* in which they are issued (i.e. initial three year period, or subsequent five-year periods) Allowances are cancelled three months after the beginning of the subsequent period. Banking between periods is achieved through issuing new allowances to replace them.

Unrestricted banking is allowed from one year to the next in the initial three year period (2005-2007), and from one year to the next in the subsequent five-year commitment periods (2008-2012 and subsequently). Member States to have discretion over whether to allow banking from the initial three year period into the first commitment period. As from 2008, Member States must allow banking from one commitment period to the next. These conditions apply *regardless* of whether the Member State is in compliance with its Kyoto obligations (i.e. an entity can bank a surplus even if MS as a whole is non-compliant).

In the initial period (2005-2007) all allowances are allocated free.. The Commission is to specify a harmonised method for allocation for the period beginning 2008. Pre 2008, the allocation method is at the discretion of Member States, who must publish and submit a national allocation plan, stating the total quantity of allowances and how they propose to allocate them. The plan must be based upon objective and transparent criteria that must be approved by the Commission. The criteria for distributing allowances between installations include:

- comply with State Aid provisions (each situation examined on its merits);
- be consistent with technological potential of installations to reduce emissions;
- take account of unavoidable increases in emissions resulting from new legislative requirements;
- not discriminate between companies or sectors in such a way is to unduly favour certain undertakings or activities;
- no installation to be allocated more allowances than it is likely to need;
- provide for comments to be expressed by the public, and arrange for due account to be taken of these.

Compliance provisions fall into three categories:

- *naming*: publishing names of operators who are not in compliance;
- *excess emissions penalty*: pay a financial penalty for each tonne of emissions for which no allowance was held.
    - *2005-2007*: the higher of €50 or twice the average market price in the period 31 Jan to 31 March of that year for allowances valid for emissions during in the previous year;
    - 2008-2012: as above, but with €100.
- *surrender allowances*: surrender allowances equal to those excess emissions in the following calendar year (note that no penalty factor is used).

How stringent these prove to be depends upon the likely allowance prices. These, in turn, will be influenced by total current GHG emissions from target groups and how these compare with the level of total allowances MS will issue.

Interfaces
The Community (not individual Member States) may conclude agreements with third countries to provide for their mutual recognition of allowances between the EU trading scheme and the third party domestic trading scheme. The Commission will draw up the necessary provisions to allow mutual recognition to take place.

The scheme is designed to be compatible with IET. The Directive implies that recognition of PAAs from another country requires a similar bilateral agreement between the Community and the other country.

The proposal does not allow the use of project based credits from JI & CDM, or of credits from national project schemes (e.g. UK). The Commission believes that the eventual inclusion of such credits is desirable, subject to the satisfactory resolution of issues regarding environmental integrity. The Commission intends to make a separate proposal for an instrument on the implementation of project based mechanisms in the EU.

Additionality issues

The fundamental problem created by the Directive is *uncertainty* - both for the future of the UKETS and the future shape of the UK climate program. This in turn will have implications for the crediting program and the long-term validity of credits. If the implications of the EUETS are not addressed, developers will be dissuaded from proposing project schemes.

The biggest incompatibility between the UKETS and the EU directive relates to the treatment of electricity. In the UKETS energy using organisations take on targets for carbon emissions that include the indirect emissions from electricity generation. These are calculated using a fixed emission factor out to 2010 that is the same as used in the CCLAs. This in turn is based on the average ESI carbon intensity in DTI energy projections, together with assumptions about transmission losses. This framework provides an incentive for reducing electricity consumption, but provides no incentive for reducing transmission/distribution losses or the carbon intensity of generation. Electricity generators are effectively excluded from participating in the scheme.

In the EUETS, generators must obtain allowances for emissions from the fuel they use. This provides a direct incentive to generators to switch to lower carbon fuels and renewables. In addition, it provides an indirect incentive (via prices) for consumers to reduce electricity consumption. The cost of electricity supply will rise to reflect the cost of carbon abatement and the net acquisition of any allowances. Businesses considering how much to reduce electricity use, whether to substitute electricity for fossil fuels or whether to co-generate heat and power on-site will then make their decisions based on: a) an electricity price which has internalised the cost of carbon abatement; and b) the price of carbon allowances relating to their on-site use of fossil fuel.

This implies that in the UK scheme, ‘ownership’ of the ESI emissions lies, at least to some extent with the electricity consumers, while in the EU scheme ownership lies with the ESI.

Running the two schemes in parallel is therefore very difficult, even if there is very limited overlap in the industrial sites that each scheme affects.[8]

Replacement of the UKETS with the EUETS is also problematic, since the EUETS is also potentially incompatible with both the CCL and the CCLAs. The origin of the problem lies with the CCL, which is an electricity tax. If the EUETS replaced the UKETS but the CCL was left intact, electricity consumers would be paying *twice* for ESI carbon emissions - once through the CCL, and once through any increase in electricity prices that result from ESI participation in the EUETS. That could be politically very difficult. The CCL could be modified, but this would threaten the CCLAs which are based upon the CCL. At the same time, industrial participants in the EUETS are the *same* companies that are now participating in the CCLAs. If the CCLAs were left unchanged, these companies would have two targets, which is clearly absurd. If the UKETS replaced the CCLAs, these companies would have to accept an absolute cap instead of a relative baseline, which is politically very sensitive. Without going into details, it is obvious that introducing the EU scheme is likely to require modification to the whole structure of UK climate policy in the business sector – the future of the UKETS is just one part of this.

The project scheme cannot escape these complexities, particularly if projects in the ESI are considered. Suppose a project involved co-firing natural gas at a coal-fired power station. Reductions below the coal-fired baseline would generate credits. But at some point in the future, the station would become part of the EU scheme. In this case, it would need to obtain allowances for its CO2 emissions, with the allocation being measured from some historical baseline, which may be before or after the introduction of co-firing. We would then have the complex situation of a single plant both requiring allowances and generating credits. A range of questions then arise, such as whether entry into the EU scheme should trigger a revision in the baseline for the crediting scheme? Alternatively, the entry into the EU scheme could invalidate any further generation of credits. But the second rule would effectively rule out ESI projects, since entry into the EU scheme could occur as early as 2005 – leaving practically no time for the generation of credits.

A second set of issues relates to the inclusion of credits in the EU scheme. At present, this is not allowed, but the Commission proposes to introduce a Directive on this topic at a later date. If the EU rules are more stringent than rules developed earlier for the UK scheme, it is possible that UK projects will not be allowed to sell their credits into the EU scheme. This is because they would threaten the EU requirements for environmental integrity. But if the EU scheme replaces the UK scheme, this means that UK projects will not be able to sell their credits within the UK either. The likely outcome in this instance is that some or all of the anticipated credits from individual UK projects would become invalid when the EU scheme is introduced. Since the EU scheme could be introduced very soon, and well within the crediting lifetime of most projects, this is a critically important issue.

In general, the linked nature of the proposed EU scheme means that it will be very difficult for the project crediting rules in one country to be less stringent than the EU standard. To do so would undermine the environmental integrity of the entire scheme. In contrast, establishing project rules that are more stringent than the EU standard may be feasible, although this would raise concerns about differential treatment and may conflict with internal

[8] Most participants in the UKETS cap & trade scheme will not be included in the EUETS. However, the CCLA participants will.

market rules. The EU's preferred approach would be to have a standardised set of rules for all Member States. This means that the UK project crediting rules will create a very important precedent. Three broad scenarios are possible:

- the UK rules subsequently become the de-facto standard throughout the EU;
- the UK rules are more stringent than the subsequent EU rules, raising competitiveness issues but probably not threatening the viability of individual projects; or
- the UK rules are less stringent than the subsequent EU rules, leading to the modification of UK project baselines and to the disallowing of some or all of the anticipated project credits.

Similar difficulties may arise in relation to early crediting. If a) banking of pre-2010 project credits is allowed; and b) the project scheme is interfaced to either the UKETS or EUETS, then banking would need to be allowed in the latter as well. This is because, even if you can distinguish between project credits and ETS allowances, they could easily be swapped to allow effective banking of allowances. Similarly, if you interfaced the project scheme to the ETS and didn't allow pre-period banking in the latter, then you wouldn't be able to bank any project credits.

In summary, the complexities and uncertainties created by the EUETS seriously threaten the viability of the project scheme. These problems being particularly acute for projects in the electricity generation sector. Some clarification of the UK's position towards the EUETS is therefore essential. Without this, the validity of the project scheme will be seriously undermined and developers will be dissuaded from developing project proposals.

4.8 Summary: policy additionality for electricity generation projects

Table 4.6 indicates which of the four main options for reducing CO_2 emissions in the sector is incentivised by existing policies

Table 4.6 Scope of policy instruments particularly relevant to electricity generation sector

Policy instrument	Year	Tx & Dx efficiency	Generation efficiency	Fuel switching	Renewables
CCL exemptions for renewable electricity	2001				✓
Renewables Obligation	2002				✓
Capital grants for renewables	2002				✓
IPPC Directive	1998		✓	✓	
New Electricity Trading Arrangements	2001			✓	✓
Proposed EU emissions trading directive	2005		✓	✓	✓

Renewables projects are unlikely to be good candidates for crediting owing to the incentives already created by the Renewables Obligation and other initiatives. Projects that improve

generation efficiency look much more promising, but here the key issue is the extent to which they are likely to be required under IPPC.[9]

Projects that improve transmission and distribution efficiency are not incentivised by any of the instruments discussed above, and hence look promising. However, the management of electricity transmission and distribution networks is a monopoly business and hence subject to economic regulation by OFGEM. As a result, to assess the additionality of such projects, it would be necessary to examine the complex requirements and incentives provided by economic regulation. This is beyond the scope of the present report.

The uncertainties created by the future implementation EUETS threaten the viability of *all* projects within the electricity generation sector. Unless clarification is obtained on this issue, project developers will be dissuaded from putting forward proposals. This Directive is therefore of fundamental importance to the future of the UK project scheme.

[9] For an assessment of the economic potential of such projects, see Mott MacDonald (2001)

5. Policies in the CHP area

Combined heat and power (CHP) occupies a unique position at the intersection of: a) environmental policy and competition policy; and b) energy supply policy and energy demand policy. By generating heat and electricity at very high efficiencies it offers an attractive means of reducing energy use and CO_2 emissions. By providing an economic means of small scale electricity generation it offers a promising route to increasing competition in generation and supply. From the point of view of the user, however, CHP is primarily a means to reduce the cost of supplying heat and power.

The government has a target for 10GWe of CHP capacity by 2010. This compares to a current capacity of 4.7GWe, estimates of a total potential in the public, commercial and industrial sectors of 10-17GWe, and estimates of a potential of 2GWe for community heating. These estimates exclude other applications of CHP, such as micro-CHP in households. The average annual rate of commissioning CHP capacity over the past five years was 250MWe, which needs to be doubled if the 10GW target is to be met (CHPA, 2001). 10GWe of CHP would lead to carbon savings of around 6MtC/year (CHPA, 2001).

The CHP target has a different status from the UK renewables target in that there is no *obligation* on a target group to commission this capacity. Instead, there is a patchwork of policies and incentives that hopefully together will deliver the 10GW outcome. These are intended to be brought together in an overall CHP strategy, but the publication of this has been repeatedly delayed. Moreover, the ordering and commissioning of new CHP capacity has being brought almost completely to a halt as a result of increases in gas prices and the introduction of NETA. As described in section 4.5, the latter has disadvantaged small generators with intermittent sales to the grid, including many existing CHP sites.

The projections in the UK climate program assume the achievement of the 10GW target, while other projections, such as those from the DTI (2000) are less optimistic. There is a double counting issue here for the projects scheme as any emission reductions from any CHP projects will have already been included in the climate program. Projects will only be additional to the climate program if the 10GW target is exceeded. In practice, developing more than 10GW is unlikely, and the projects scheme may provide a valuable additional incentive for certain types of CHP investment.

5.1 Potential project types in the CHP area

CHP projects may be viable in a wide range of sectors, including industry, public & commercial buildings, the domestic sector, community heating, sewage treatment and landfill sites. The CHP market is best categorised as follows:

- *small scale systems:* based on gas-fired spark ignition engines up to around 1MW in size. Most of the heat generated is in the form of hot water. These systems find their main application in service sector applications, such as office blocks, hotels and leisure centres.
- *small-medium sized industrial systems:* based on gas turbines or compression ignition diesel engines and fired on HFO or dual gas/gasoil. These also have a significant proportion of heat in the form of hot water. Industrial systems range from about 1MWe up to a few tens of MWe. As well as industry, hospitals are a large market.

- *large industrial systems:* based on traditional steam turbine technology or gas turbines, with sizes from tens of megawatts and delivering process steam. The main sectors include chemicals, iron and steel, paper, food and drink and oil refining. These account for the bulk of UK CHP capacity. Steam turbines are driven by high-pressure boilers which can use a variety of fuels, including non-commercial fuels.
- *biofuel/waste fired CHP:* This is a niche market, with a large number of schemes in sewage treatment works. Here, methane-rich sewage gas is burnt in engines, with the heat used to maintain the temperature in the anaerobic digester and the electricity used mainly to drive pumps and fans. Other potential applications include landfill sites and the incineration of municipal solid waste.
- *community heating:* This can be done either on a large scale (city-wide CHP, or district heating) or at a smaller scale (the use of engines in blocks of flats). The former can use a range of technologies, while the latter normally employs small spark ignition engines. Community heating has not developed extensively in the UK, in contrast to some parts of continental Europe, partly as a consequence of the existing gas network for central heating. However, the use of CHP in blocks of flats is a growth area.
- *micro-CHP:* This covers the use of technologies at the level of the individual home or within small blocks of flats. While gas engine CHP is technically possible, the main interest is in new technologies such as Stirling engines and fuel cells.

The first four of these categories are relevant to the project scheme. Community heating and micro-CHP are largely excluded from the project scheme, since they relate to the domestic sector.

CHP plants are normally sized to meet a portion of the heat load and to displace imported electricity. Since the heat to power ratio of the unit is commonly different from that from the site, there may be a need both to import top-up electricity and to export surplus electricity. Small CHP sites are rarely sized to export electricity, but some large sites may be significant exporters. The economics of CHP investment depend upon a wide range of factors, but particularly upon the number of hours operation in a year. At current energy prices, CHP is only economic at sites where there is 2-3 shift working for more than 5 days a week. This effectively rules out CHP for a large number of end use applications (e.g. commercial offices). Changes in energy prices, and in particular the *differential* between fuel and electricity prices, may change this situation.

5.2 Policy influences in the CHP area

Table 5.1 summarises the most important policy measures relevant to CHP, using our standard classification system. This table *excludes* policies relevant to CHP projects in the domestic sector – i.e. micro CHP and community heating.

Since CHP projects can be undertaken in a wide range of sectors, there are a correspondingly diverse range of policy influences. The relevance of each policy in Table 5.1 will depend upon the nature of the individual CHP project, including its size, the fuel used and the sector in which it is located. For example, CHP projects in the manufacturing sector are incentivised by exceptions from the CCL, but CHP projects in the upstream energy industry (e.g. oil refineries) are not. Similarly, CHP projects above 10MW need to obtain consent from the DTI, while smaller projects do not. Overall, the picture is complex, with some

potential projects having multiple policy influences and others having relatively few. But in no case would a potential CHP project be free of other policy influences.

The following sections discuss a selection of these policies, identifying where possible their implications for CHP projects under the crediting scheme. Only those policies which are considered particularly relevant are discussed. Given both the unique nature of CHP and the wide range of CHP project types, there is considerable overlap with the policies relevant to the built environment, electricity generation and waste/methane areas.

Table 5.1 Climate policy measures in the CHP area (excluding domestic sector and community heating)

Broad category	Instrument type	Key instruments relevant to CHP area
Education, information & moral suasion	Education, information & moral suasion	• Energy Efficiency Best Practice Program
Voluntary approaches	Unilateral commitments	• Voluntary energy efficiency agreements (e.g. hotel sector) • Voluntary targets for the government estate and other public sector buildings
	Public voluntary schemes	• Making a Corporate Commitment Campaign
	Negotiated agreements	• CCLAs for energy intensive industry
Economic instruments	Charge systems	• CCL (fuel use for 'good quality' CHP is exempt)
	Trading mechanisms	• Trading arrangements for CCLAs • Voluntary participants in UKETS cap and trade program • Proposed EU emissions trading directive
	Financial instruments	• Enhanced capital allowances for investment in 'good quality' CHP (all sectors) • Exemption of CHP from business rates • Capital investment in public sector building/refurbishment projects that include CHP
Command and control	Framework based standards	• IPPC Directive - energy efficiency requirements • LCP Directive – encouraging CHP for new plants • Consents policy for new power stations
	Performance based standards	• Revised building regulations Part L • EU directive on the energy performance of buildings
	Technology based standards	• Revised building regulations Part L

Note: Excludes policies relevant to the domestic sector, including community heating.

5.3 Voluntary energy efficiency agreements, voluntary targets in the public sector and MACC

These policies and initiatives were discussed in the section 3. In each case, CHP projects may contribute towards the energy efficiency target for the site or sector. CHP is particularly relevant to the hotel sector, and hence to the HCIMA agreement, since the high annual occupancy of hotels makes many CHP projects viable. The implications for individual projects were highlighted in section 3.

5.4 Climate Change Levy

Instrument description

The basic elements of the CCL were described in section 3.6. The policy relevance to CHP is that fuel used in 'good quality' CHP schemes is exempt from Levy. The rules defining what is meant by good quality are set out in detail in (DETR, 2000b) and relate primarily to acceptable levels of heat and electrical efficiency (including a minimum electrical efficiency of 20%). The rules for CCL exemption require a rather artificial division of CHP fuel use between that used for heat production and that used for electricity production. Fuel used for heat production or for the generation of electricity that is used on site is exempt, but fuel used for the generation of electricity that is exported to the distribution network is *not* exempt. The rationale for this rule is questionable, as it would appear to penalise existing schemes that export electricity, and discourage the optimal sizing of new CHP schemes.

Additionality issues

Any CHP project in a sector that is eligible for the CCL (i.e. projects in most of the public, commercial and industrial sectors, but excluding upstream energy) will be incentivised by the exemption from the CCL. This incentive must be factored in when calculating the economics of the project and is very relevant to the determination of additionality. One perspective could be that no such projects should be eligible for credits as they already receive a strong incentive. Another perspective could be that the additionality of such projects should be considered on a case-by-case basis, considering the economics of the individual projects. In making this judgement, it needs to be recognised that CHP still faces numerous obstacles and that there is considerable doubt as to whether the government's 10GW target will be achieved.

5.5 Negotiated agreements for energy intensive industry (CCLAs)

It is very unlikely that CHP projects at facilities that are signatories to a CCLA would also be eligible for project credits. But the basic elements of these agreements and the associated trading arrangements are set out here for reference.

Instrument description: basic agreements

The CCLAs, which came into force on 1st April 2001, are negotiated agreements between energy intensive companies and the government. The objective of the CCLAs is to cushion energy intensive industries from the full impact of the CCL, while at the same time securing quantified improvements in energy efficiency and thereby contributing to the UK carbon targets. The agreements were negotiated on behalf of individual companies by the industry

trade associations and contain legally binding targets denominated in either energy use (GWh), energy intensity (GWh/unit of output), GHG emissions (MtC equivalent), or GHG intensity (MtC/unit of output). These targets are defined for two yearly intervals up to 2010. Signatories to a CCLA are eligible for an 80% reduction on the Climate Change Levy (CCL).

CCLAs have been negotiated with 44 industrial sectors representing around 7000 industrial installations . The government estimates that the CCLAs will reduce emissions of CO_2 from industrial installations by 2.5MtCe/year by 2010. This corresponds to a 12% reduction on the current annual emissions of 20.8MtC from CCLA participants

The agreements are complex and vary from sector to sector in a number of respects, including:

- *baseline year:* this can be any year from 1990 to 2000;
- *absolute or relative targets*: nearly all sectors have opted for relative targets (e.g. % reduction in energy use per unit of output), with only the steel and aerospace sectors agreeing to targets for absolute energy consumption.
- *value of the targets*: the percentage improvement over the baseline year varies widely between sectors;
- *risk management procedures*: some sectors are allowed to adjust their targets if there are changes in product mix or output level, while others have adopted a 'tolerance band'.

The negotiation of the targets was based on a bottom up database of industrial energy efficiency opportunities held by ETSU (ETSU, 2001). This distinguishes between 'technically possible' opportunities and 'cost effective' opportunities, where the latter includes assumptions about investment criteria in different sectors. In the majority of cases, the target is based on a percentage of the cost effective opportunities, where the latter are defined as investments with relatively short paybacks (e.g. 3 - 4 years). The targets also include assumptions about the scope for CHP.

The CCLAs apply to energy intensive industry. For reasons of administrative simplicity, the government chose to define energy intensive sectors as those sectors with installations regulated under the IPPC Directive (this excludes LCP installations). IPPC covers the majority of energy intensive sectors (e.g. aluminium, cement, ceramics, chemicals, food & drink, foundries, glass, non-ferrous metals, paper, and steel), but not all IPPC installations are energy intensive. Hence, a number of non-energy intensive sectors have also negotiated a CCLA.

Installations regulated under IPPC are automatically eligible for a CCLA. In addition, the following installations are also eligible:

- Installations in 'IPPC sectors' that are below the below the IPPC size threshold.[10] These were required to be included in the CCLAs on the grounds of competition law, with the result that even very small sites in 'IPPC sectors' are now covered by the CCLAs.
- Installations in a number of energy intensive sectors that lie outside IPPC, such as the water industry.

[10] With the exception of the 50 MW threshold for combustion plant.

The entity regulated under a CCLA is termed a *facility*. The definition of a facility is based on that for an installation, but is not identical to it. In many cases, the CCLA facility covers a greater proportion of the energy use at the site than the IPPC installations.

Instrument description: trading in the CCLAs

The CCLAs were developed prior to the UKETS, but are now also included in the trading scheme. The nature of their participation is described in detail in Sorrell (2001). CCLA companies can generate 'credits' (not the same as project credits) by exceeding their individual targets. These credits are generated ex post, when emissions are compared to the milestone targets at two-year intervals.

Credits can be traded with other CCLA companies and also with companies in the cap & trade scheme. However, since most of the targets under the CCLAs are defined in terms of energy intensity (unit targets) rather than carbon emissions (absolute targets), linking the CCLA sector to the cap & trade sector is problematic as increases in output from the former can lead to increases in total emissions, thereby violating the emissions cap. As a consequence, trading by CCLA participants with *relative* targets is subject to restrictions to prevent inflation in the total number of allowances. A 'Gateway' has been developed to prevent a net transfer of allowances from the CCLA sector to the cap & trade sector. There are no restrictions on allowances sales in the other direction, and CCLA participants with *absolute* targets are not subject to any restrictions.

The finer points of these arrangements are not relevant here (for details, see Sorrell 2001). What is relevant is that the trading arrangements create an incentive for companies to exceed their individual CCLA targets, and to generate credits for sale. These 'CCLA credits' are distinct from project credits, although the principle (baseline & credit) is the same.

Additionality issues

Whatever the nature of the target (absolute/relative, carbon/energy), companies that are signatories to a CCLA may consider investment in CHP to help them meet their target – although investing in CHP will not be the only way in which a target could be met. Furthermore, under the agreements each operator is required to conduct an assessment of the technical and economic feasibility of CHP on their site by September 2002. If the studies show that there is a cost-effective CHP opportunity, the government will review the targets for the site. Finally, the trading arrangements provide an additional incentive for CHP investment to generate surplus credits. This suggests that, while the CCLAs do not absolutely *require* CHP investment, they provide a very strong incentive for it.

The CCLAs may be an important stimulus to CHP. But since CHP investment at CCLA sites is already incentivised by: a) legally binding targets; b) the trading arrangements; and c) exemption from the remaining 20% of the CCL, there are no grounds for such projects being eligible for additional project credits. As with the cap & trade scheme, emissions covered by the CCLAs should be *outside* the scope of the project scheme.

Looking at the combined influence of the CCL and CCLAs on CHP projects, it is useful to distinguish:

- Projects in sectors outside the scope of the CCL (e.g. refineries). Here, levy exemption from the CCL delivers no benefit

- Projects in sectors within the scope of the CCL, but not in CCLA. Here CHP is already incentivised by CCL exemption.
- Projects in sectors covered by a CCLA and undertaken in order to meet their targets. Here CHP is already incentivised by the CCLA target.
- Projects in sectors covered by a CCLA and undertaken in order to exceed their targets. Here CHP is already incentivised by exemption from the remaining 20% of the CCL and by the scope for selling surplus credits.

The CCLAs do not cover all the carbon emissions at individual sites, and companies that are participants to a CCLA may also have sites that are outside the agreements. Hence, it is possible that participants in a CCLA may wish to invest in CHP and claim credits for projects that are outside the scope of the agreements.

5.6 Voluntary participants in UKETS cap and trade program

As with the CCLAs, voluntary participants in the & trade scheme are incentivised to invest in CHP, both to meet their targets and to free up surplus allowances. And, as with the CCLAs, these type of projects should not be eligible for project credits.

However, it may be the case that participants in the cap & trade program have sources which are not covered by the program and for which they may be interested in developing crediting projects. If this occurs, individual companies will be involved in more than one component of the UKETS.

5.7 Enhanced capital allowances for investment in 'good quality' CHP

Instrument description

The framework for ECAs was described in section 3.8. 'Good quality' CHP is eligible for ECAs, in the same manner as it is eligible for exemption from the CCL. The difference is that this incentive applies to *all* CHP projects, regardless of type fuel and location. In contrast, the CCL exemption only applies to those sectors and fuels that are eligible for the CCL.

Additionality issues

As with energy efficiency projects in the non-domestic building sector, access to ECAs will enhance the financial attractiveness of CHP to business because it changes their cash flow. It is important to note, however, that ECAs do *not* change the basic economics of a CHP project which depends upon the ratio between capital costs and savings in energy costs. ECAs may nevertheless be a relevant factor to be taken into consideration when assessing project economics and additionality.

5.8 IPPC Directive

Instrument description

The IPPC Directive was described in section 4.6. There two ways in which this could be relevant to CHP projects:

- *Large combustion plant (>50MW thermal input)*: New large combustion plant (LCP), or major revisions to existing LCP, will need to meet IPPC requirements, as interpreted by the local Inspector. In some circumstances, the requirements could be interpreted as requiring CHP. Relevant LCP may include: a) industrial plant in sectors covered by the CCL or CCLAs; b) industrial plant in upstream energy sectors outside the CCL/CCLAs (e.g. oil refineries); c) electricity generation plant; d) large community heating schemes; and e) landfill gas / methane recovery projects that exceed 50MW.
- *Combustion plant in other IPPC sectors*: Large sites in sectors such as chemicals are regulated under IPPC, whether or not they contain LCP. As described in section 4.6, IPPC includes energy efficiency requirements for these sites, although this does not mean strict BAT for energy efficiency. In some circumstances, the Inspector may interpret these as requiring the site to invest in CHP (probably only when existing plant is replaced). This situation is complicated in that the great majority of sites regulated under IPPC are also included in the CCLAs.

Additionality issues

Both cases are problematic from the perspective of project credits. In the first case, CHP may be required by the Inspector, in which case there is no additionality. In the second case, CHP may be required by the Inspector, and at the same time may be incentivised by CCL exemptions and CCLA targets. Neither situation looks promising for crediting projects.

5.9 Large Combustion Plant Directive (LCPD)

CHP projects that qualify as large combustion plant are not only covered by IPPC but also by the Large Combustion Plant Directive (LCPD) (CEC, 2001). Article 6 of this Directive requires that, for *new* plants, the technical and economic feasibility of providing for CHP be examined. The meaning of 'feasibility' is open to interpretation in individual circumstances and in the UK this is likely to be the responsibility of the Environment Agency Inspector. Hence for new LCP, the incentives for CHP investment created by IPPC are reinforced by additional incentives from the LCPD.

5.10 CHP in power station consents

Under Section 36 (power stations) of the Electricity Act 1989, consent is required from the Secretary of State for Trade & Industry for the construction, extension or operation of any generating station of over 50MWe. Similarly, under section 14 (1) of the Energy Act 1976, energy policy consent is required for power stations of 10 MW or more if they are fuelled by oil or natural gas. The first of these is primarily relevant to power stations and to generating plant on large, energy intensive industrial sites, while the second is relevant to a much wider range of industrial generation.

In both cases, developers are now required to seriously explore the opportunities for CHP, rather than electricity only generation. The relevant local heat load could be the host site, neighbouring industrial sites or households via a community heating scheme. Government guidance on this recognises the CHP may often not be technically or economically practical, but requires that it be explored. The practical effect of this requirement will depend upon the manner in which it is interpreted by the DTI - for example, what investment criteria should be used to decide when a CHP project is uneconomic?

The assessment of CHP potential is therefore mandatory for the great majority of new generating plant above 10MWe. This is a relevant consideration to take into account if a CHP project of this size is applying for project credits.

5.11 EU Directive on the energy performance of buildings

The EU Directive on the energy performance of buildings was described in section 3.11. One way the Directive goes beyond existing UK building regulations is the requirement for new buildings with a surface area >1000 m^2 to investigate the technical and economic feasibility of installing CHP. The results should be made available to stakeholders. As with the IPPC, LCPD and power station consents, the impact of this will depend upon how (and by who) 'economic feasibility' is interpreted. The difference is that, whereas IPPC, the LCPD and power station consents only apply to large industrial CHP installations, the EU Directive applies to a much wider range of non-domestic buildings. This means that the incentive could be very relevant to the additionality of CHP projects in non-domestic buildings.

5.12 Summary: policy additionality for CHP projects

It is clear from the above that the policy incentives for CHP projects are numerous and complex. This creates difficulties for assessing the additionality of such projects. Many CHP projects, such as those located on sites covered by the CCLAs or the cap & trade scheme, will not be eligible for project credits. But the status of other projects, such as those at oil refineries and other upstream energy plants, is more difficult to assess.

Table 5.2 attempts to summarise the sectoral coverage of different policies relevant to CHP, distinguishing between broad sectors (e.g. energy industry) and subgroups within those sectors (e.g. power stations). Any such table oversimplifies the coverage of each policy, but it does provide a useful overview. Three size threshold are also relevant:

- *Large combustion plant*: >50MW thermal input, which are regulated under the LCPD and IPPC Directive;
- *Power station consents:* > 10MW electrical output, which need to obtain consent from the Secretary of State; and
- *Large buildings:* >1000m^2, which are required to investigate CHP potential under the EU Directive on the energy performance of buildings.

Many of the incentives for CHP depend upon the site specific interpretation of various regulatory requirements. These include:

- Interpretation of IPPC and LCPD requirements by Environment Agency inspectors;

- Interpretation of the requirements of the EU Directive on the energy performance of buildings by local authorities and approved inspectors;
- Interpretation of the requirements of power station consents by the Secretary of State for trade & industry.

In each case, the policy encourages CHP, but does not require it. In contrast, the CCL provides an economic *incentive* for CHP investment by improving the rate of return. The ECAs do not change the basic economics of CHP investment, but do make it more attractive by improving organisational cash flow.

Two very promising areas - community heating and micro-CHP - are excluded from the project scheme as they relate to the domestic sector. As argued in Annex 1, this represents a substantial missed opportunity.

Table 5.2 Scope of particularly relevant policies in the CHP area

Sector	**Subgroup**	**CCL**	**CCLAs**	**UKETS cap & trade**	**IPPC**	**LCPD (only if >50MW)**	**ECAs**	**EU Buildings Directive**	**Power station consents**
Energy industry	Power stations				✓	✓	✓	Blds only	✓
	Oil refineries				✓	✓	✓	Blds only	
	Other				✓	✓	✓	Blds only	
Manufacturing	CCLA companies	✓	✓		✓	✓	✓	Blds only	
	UKETS cap & trade	✓		✓		Some	✓	Blds only	
	Other	✓				Some	✓	Blds only	
Public	Buildings	✓					✓	✓	
Commercial	UKETS cap & trade	✓		✓			✓	✓	
	Other	✓					✓	✓	
Waste industry	Landfill (CH_4 recovery)				✓	Some	✓		
	Incineration				✓	Some	✓		
Domestic	Community heating				Some	some	✓		
	Micro CHP			✓			✓		

6. Policies in the methane recovery area

Methane recovery and use as energy from landfill and mines are candidate projects. Both types of projects reduce methane emissions, while producing CO_2. The methane could be reduced by flaring, but greater environmental benefit is had through using the energy to generate electricity and/or heat

Methane is generally generated by the biodegradable component of waste streams. Each year the UK produces around 400 million tonnes of waste. Around 300 million tonnes of this is aggregates, mining, sewage and sludge, construction and demolition waste. The remainder consists of 48 million tonnes of industrial waste, 30 million tonnes of commercial waste and 28 million tonnes of municipal waste. Around 54% of commercial and industrial waste and 83% of municipal waste goes to landfill. In total, 58% of the waste stream excluding construction & demolition waste goes into landfill (DEFRA, 2000).

It is municipal waste that contains the largest amounts of methane producing active biodegradable waste. This waste stream is growing by 3%/year.

Table 6.1 Waste Management in England and Wales 1998/19992.

	Landfill	**Recovery (including recycling, composting & energy recovery)**	**Recycling/composting**
Industrial waste (excluding construction & demolition)	47%	45%	39%
Commercial waste	66%	33%	29%
Municipal waste	83%	17%	9%

Source: PIU (2001)

Methane is a powerful greenhouse gas which landfill operators are obliged to collect and treat either by flaring or through energy recovery. Landfill gas energy recovery schemes have been supported by the Non Fossil Fuel Obligation (NFFO) and support for new schemes will continue under the Renewables Obligation. Since the introduction of NFFO in 1990, 306 projects have been contracted with a planned capacity of 650MWe, of which 200MWe (representing 107 projects) were operational at the end of 1998 (DEFRA, 2000).

Gas is currently utilised from six mines in the UK, with the industry anticipating another ten to come on line soon. The trade association, Association of Coal Mine Methane Operators, claim a potential 750MW from mines by 2010 is possible. The Association argues that sites with a capacity below 5MW are not viable without subsidy, and that there are 100 sites with potentials above 5MW and 300 sites above 1MW (ENDS, 2001). These are industry figures whose empirical basis is unclear and should be treated cautiously – perhaps as indicating a top-end, optimistic estimate of project potentials.

6.1 Policy influences in methane recovery

There are four main policy instruments which target landfill activities and regulate them: the Renewables Obligation scheme; the IPPC Directive; exemption of electricity from landfill

gas from the CCL; and the Landfill Directive (which sets standards for the operation and closure of landfills). In contrast, methane recovery from mines is relatively free from policy instruments and at present is not eligible for either support from the Renewables Obligation or the CCL exemption.[11] Table 6.2 categorises these policies using our standard framework.

[11] Draft Statutory Instrument 2002, 8(10) at http://www.hmso.gov.uk/si/si2002/draft/20029337.htm

Table 6.2 Climate policy measures in the methane recovery area

Broad category	Instrument type	Key instruments relevant to methane recovery sector
Education, information & moral suasion	Education, information & moral suasion	
Voluntary approaches	Unilateral commitments	
	Public voluntary schemes	
	Negotiated agreements	
Economic instruments	Charge systems	• CCL – exemptions for renewables
	Trading mechanisms	• Renewables Obligation
	Financial instruments	•
Command and control	Framework based standards	• IPPC Directive • Landfill Directive
	Performance based standards	• Landfill Directive
	Technology based standards	

6.2 Renewables Obligation

Instrument description

The Renewables Obligation was described in section 4.3. Landfill gas projects which generate electricity are eligible to receive ROCs and concomitant revenues. The greatest revenue operators of such projects can expect from the ROC market is effectively limited by the Buyout Price (£30/MWh) – since if the market price for ROCs exceeds this level then it becomes cheaper for electricity suppliers to pay the fine than buy ROCs.

It is worth noting that over half of the growth in renewables capacity between 1990 and 1998 has come from energy-from-waste plant (including landfill gas). In the fifth round of renewable energy projects approved for price subsidy in 1998 (under the old NFFO scheme) onshore wind comprised 29 per cent (by electrical capacity) of the projects approved, while energy-from-waste made up 68 per cent (RCEP, 2000). Moreover, government anticipates these technologies continuing to make a significant contribution: supplying over half the ten per cent target for 2010 (DTI, 1999).

Additionality issues

As described in section 4.3, qualifying renewables projects can earn ROCs, and in some cases can earn carbon credits as well, but not both for the same MWh. The process by which the latter are created is different from the arrangements under the project scheme and relies on a supplier baseline rather than a project baseline or a UK aggregate baseline.

Methane recovery projects that generate electricity and claim ROCs are unlikely to be candidates for the creation of separate project credits under the project scheme, as this would merely compound the problems of double counting. It is conceivable that such projects could be allowed to generate credits, provided that they did *not* at the same time claim ROCs. However, this seems unlikely as the sale of ROCs is likely to prove a substantially more profitable revenue stream than the sale of carbon credits.

As with other renewables projects, the fact that such a route looks unpromising should not necessarily mean that it is ruled out in principle. However, if a methane recovery project were to become eligible for crediting, there are serious questions over the system boundary. For example, should a renewables project be awarded credits when the UK as a whole has less renewables capacity than required under the Renewables Obligation? This question can only be resolved with reference to broader UK energy policy objectives.

A secondary question is whether a methane recovery project that generates heat but not electricity should be eligible for project credits. These are entirely outside the Renewables Obligation, so the above issues do not arise. In practice, such projects may be unlikely given both the difficulty of using the heat at many landfill sites and the relative ease with which profitable electricity generation can be added. There is also the question of the incentives created by IPPC and the Landfill Directive. These are described below.

6.3 Integrated Pollution Prevention and Control

Landfills are regulated under the IPPC regulations - which were described in section 4.6. The timetable suggests they will become regulated under IPPC from 2003. The European

Commission has said that there will be no BREF Note for landfills. This is because the necessary technical standards are covered in other Directives. Most notably, permit conditions issued under IPPC will relate to prohibitions and targets introduced under the Landfill Directive. The Landfill Directive is discussed below. The IPPC regulations provide the administrative framework under which Landfill Directive requirements will be implemented.

The IPPC Directive only applies to landfills receiving more than 10 tonnes/day, or where the total capacity exceeds 25,000 tonnes. No information has been obtained to date on either the number of landfills within different size categories, or on the regulations relevant to landfills below the IPPC size boundary. This needs further work.

6.4 Landfill Directive

The 1999 Landfill Directive (1999/31/EEC) sets a number of targets and prohibition deadlines for items going to landfill. It requires landfills to be classified (e.g. as hazardous or non-hazardous waste facilities) and sets standards accordingly.

Instrument operation

The IPPC regulations will be the process by which the Landfill Directive will be implemented. The government anticipates the process of issuing all relevant landfills with IPPC permits to be complete by 2007 (DEFRA, 2001b: 8). The objectives of the Landfill Directive objectives are as follows:

- Reduce bio-degradable waste inputs
    - to 75 per cent of the 1995 level by 2010
    - to 50 per cent of the 1995 level by 2013
    - to 35 per cent of the 1995 level by 2020
- Ban co-disposal of hazardous and non-hazardous waste after July 2002
- Ban the landfill of whole tyres by 2003 and by 2006 for shredded tyres
- Ban the landfill of liquid wastes, infectious clinical materials and certain types of hazardous waste (e.g. explosive, flammable wastes)
- Set standards for the control, monitoring, reporting and closure of landfill sites.

The government's Waste Strategy 2000 is intended to set out the changes in waste management needed to respond to the Landfill Directive amongst other drivers.

Landfill operators must submit a Site Conditioning Plan to the regulator (the Environment Agency) that sets out how the operator proposes to comply with the Directive. These plans must be submitted by July 2002. On the basis of these plans, some operators will be required to operate as normal under existing Waste Management Licenses for the time being. Others will have to apply for an IPPC permit that incorporates Directive conditions.

The Environment Agency is producing Technical Guidance concerning how Landfill Directive requirements and IPPC can be fulfilled, including BAT for landfills. The Directive stipulates that provisions should be in place for care of the landfill once it is closed (Article 13), i.e. after it has ceased to accept waste. This includes monitoring of landfill gas. The Environment Agency has produced draft technical guidance that includes information on the

management of landfill gas.[12] The Directive does not stipulate how landfill gas should be managed, merely that 'environmental protection systems are functioning fully as intended' (Annex III). However, the Environment Agency draft technical guidance suggests it will expect operators to consider the feasibility of utilising the gas to produce energy:

> 'Landfill gas shall be collected from all landfills *receiving biodegradable waste* and the landfill gas must be treated and used. If the gas collected cannot be used to produce energy, it must be flared' (Environment Agency, 2001: 34)

It seems the Environment Agency will require landfills to install energy-from-gas projects where appropriate as part of the BAT conditions under IPPC.

Additionality issues

Two additionality issues lie in the above introduction to methane from landfill. First, the reduction in biodegradable inputs required from the Landfill Directive will, over time, reduce the generation of methane from this sector. However, given the time-scale of the targets relative to the lifetime of the ETS, methane reductions are unexpected to bite into the number of energy-from-gas projects available from the current 'stock' and management of landfills. Second, draft Environment Agency guidance on implementing the IPPC and Landfill Directive regulations imply they will be looking for energy-from-gas projects in landfill operators' Site Conditioning Plans. It is unclear how vigorously the Agency will pursue this preference. However, some sort of clarification should be sought since it obviously affects the baseline and/or additionality assumptions underlying project mechanisms in the ETS.

6.5 Climate Change Levy

The Utilities Act, 2000 Clause 50 defines renewable energy sources as 'sources of energy other than fossil fuel or nuclear fuel, but includes waste of which not more than a specified proportion is waste which is, or is derived from, fossil fuel'. This is the definition cited by HM Customs & Excise when deciding which renewable sources are exempt from the Climate Change Levy. Electricity generated from landfill gas would appear to qualify for the CCL exemption. However, since methane from mines is derived from fossil fuel, it would *not* appear to qualify for exemption. At the time of publishing their guidelines on CCL exemptions, in March 2001, mine methane projects were not exempt from the tax. However, John Doddrell of the DTI Sustainable Energy Unit was reported as saying at a conference in September 2001 that methane from mines would qualify the CCL exemption (ENDS, 2001b). The current status of these projects with regard to the CCL therefore needs checking.

6.6 Summary: policy additionality for methane recovery projects

The above review suggest that landfill projects that recover methane to produce *electricity* are: a) eligible for Renewable Obligation Certificates; b) incentivised by exemption from the CCL; and c) likely to be required, or at least strongly encouraged, under the Landfill Directive and IPPC. In contrast, projects that recover methane to produce *heat* are only incentivised by IPPC and the Landfill Directive. In both cases there is a need for policy guidance on the eligibility of such projects for crediting. In particular, there is a need for clarification of the treatment of such projects under IPPC. This is entirely separate from the

[12] See http://www.environment-agency.gov.uk/commondata/105385/ippclandfill.pdf

interpretation of the energy efficiency requirements of IPPC, which are relevant to projects in other sectors.

The coexistence of multiple polices to encourage methane recovery from landfill would appear to militate against the inclusion of such projects in the crediting scheme. This is particularly the case where the projects generate electricity and hence are eligible for ROCs.

In contrast, methane recovery from coal mines appears relatively free of policy influence and hence of problems of policy additionality. These projects are not eligible for ROCs and do not, at present, qualify for exemption from the CCL. This suggests that such projects may be good candidates for inclusion in the crediting scheme.

7. Policies in the transport area

Transport is the third largest source of greenhouse gas emissions in the UK and emissions are increasing faster in transport than in any other sector. In 2000, CO_2 emissions from the UK transport sector were 39.1MtC, an increase of 4% from 1990, while emissions from road transport increased by 7.4% over this period. In the absence of policy initiatives, total GHG emissions from transport are forecast to grow by 15% by 2010 (DETR, 2001).

The UK climate strategy relies heavily on an EU voluntary agreements with car manufacturers to improve car fuel efficiency. This is anticipated to reduce transport CO_2 emissions by 4MtC/year by 2010. In contrast, the full array of other transport initiatives included in the government's 10-year plan for transport (including £121 billion of capital investment) is only expected to reduce emissions by 1.6MtC/year. This illustrates the strength of the underlying forces driving transport growth, and the extent to which transport emissions are dominated by the private car. Transport is therefore a priority area for climate policy, but one which has proven especially difficult to address.

It is not possible to treat the transport sector in the same manner as the other sectors discussed in this report. This is primarily because of the enormous range of potential projects that could reduce carbon intensity in the transport sector. At one extreme, we have large infrastructure projects such as the upgrading of the East Coast mainline. At the other extreme, we have small-scale voluntary initiatives such as the introduction of a car sharing scheme by a small business. In between there is an array of technical, behavioural, economic and infrastructural initiatives which have varying impacts on transport emissions over different time scales and which are difficult to group within simple categories. The policy influences on such a diverse range of projects is correspondingly very large, as is the range of organisations that could potentially be involved.

7.1 Potential project types in the transport sector

Transport projects may save carbon emissions by reducing the carbon intensity of transport services, in the same manner that energy efficiency projects save carbon emissions by reducing the carbon intensity of energy services. Transport services primarily relate to *accessibility* to jobs, leisure, retail and services. But there are three ways in which transport projects are likely to differ from many of the energy projects discussed in the previous sections:

- *Objectives*: Transport projects are more likely to have multiple objectives - for example, reducing congestion, tackling social exclusion, improving air quality etc – and to have carbon saving as a secondary concern.
- *Economics*: The economics of transport projects are significantly more complex than those of energy projects, with costs and benefits being distributed between a large number of groups and with many of these not being reflected in market prices (e.g. the costs of lost working due to congestion; the costs of damage to buildings through air pollution; health costs of asthma etc.). Many transport projects - and particularly infrastructural projects funded wholly or partially by local or national government - are not justified through straightforward investment appraisal alone, but through the consideration of wider public objectives.

- *Carbon saving*: The carbon saving associated with many transport projects is difficult to assess, owing to wide or 'fuzzy' system boundaries and the need to make assumptions based on limited data. As an illustration, how do you quantify the impact of a new urban cycle network on transport emissions in the urban area? Developing a counterfactual baseline is likely to be significantly more difficult for a transport project than for an energy efficiency or energy supply project. It is notable that transport projects are largely absent from the AIJ program and from more recent crediting initiatives such as ERUPT.

As a first step towards classifying different types of transport projects we can distinguish between:

- *Reducing activity*: Reducing the aggregate volume of transport demand, measured in passenger or tonne km. This depends heavily on geographical factors, such as the average distance between home and work, as well as income factors such as the demand for foreign holidays.
- *Changing modal structure*: Displacing passenger (or tonne) km from carbon intensive modes, such as passenger cars, to less intensive modes such as trains, buses, cycling & walking.
- *Reducing energy intensity*: Reducing the energy use per passenger (or tonne) km for individual transport modes. This depends on the technical efficiency of vehicles, and on load factors and operating conditions.
- *Reducing carbon intensity*: Reducing the carbon emissions per unit of energy use in each mode. This primarily depends on the fuel mix.

It is possible to conceive of projects that influence one or more of these four variables. In addition, it may be also useful to classify projects according to:

- *Scale*: this may range from large infrastructure projects (e.g. a major new rail link), to small neighbourhood initiatives (establishment of a Home Zone to encourage walking);
- *Timeframe*: this may range from very long (e.g. a new metro line), to relatively short (e.g. refurbishment of existing trains to improve fuel efficiency); and
- *System boundaries*: this may range from narrow (e.g. conversion of a delivery fleet to gas fuelling), or wide (e.g. developing a new high-density housing project on a brown field site).

From the perspective of crediting, small projects with relatively short time frames and narrow system boundaries are likely to create far fewer difficulties for both the estimation of baselines and the demonstration of additionality. Table 7.1 list some possible projects and classifies them according to the above variables. While these are illustrative examples, they do suggest that projects to reduce carbon/energy intensity may be more feasible for crediting than those focused on reducing activity or encouraging modal shifts.

Most of the larger scale, longer term infrastructure projects in the UK are wholly or partially funded by public authorities and would not be natural candidates for crediting. However, with increasing use of Public-Private Partnerships (PPPs) and other initiatives, private sector involvement in infrastructure investment is increasing. This creates the possibility that the private companies involved in infrastructure projects will explore opportunities for project crediting. Similarly, transport providers, such as rail franchisers & bus companies, are

largely in the private sector and may similarly seek credits for investment projects that improve carbon/energy intensity or displace passenger/tonne kms from more energy intensive modes.

Table 7.1 Illustrative projects in the transport sector

Area	Example project	Scale	Timeframe	System boundary
Reducing travel activity	Using a home delivery service to reduce the number of car trips to a retail centre;	Small/ medium	Short	Wide
	Promoting high-density, mixed-use developments in which travel requirements for commuting, retail and leisure are reduced; and	Large	Long	Wide
	Local sourcing of fruit and vegetables, to reduce the vehicle km associated with food provision	Small/ medium	Short/ medium	Wide
Changing modal structure	Public subsidy of bus services	Medium	Medium	Medium
	Investment in 'safe routes to schools';	Small	Long	Wide
	Major infrastructure provision, such as tram services in city centres	Large	Long	Wide
Reducing energy intensity	Fleet purchase of fuel efficient cars;	Small/ medium	Short/ medium	Narrow
	Establishment of car sharing schemes by local authorities, business, community organisations, schools, hospitals etc. as part of the wider development of Green Transport Plans.	Small/ medium	Short	Narrow/ medium
	Improvement of freight logistics to reduce the amount of 'empty running' of freight vehicles.	Medium	Short	Narrow
Reducing carbon intensity	Conversion of vehicle fleets to alternative fuels such as natural gas.	Small/ medium	Short/ medium	Narrow
	Public investment in alternative fuel infrastructures.	Medium/ Large	Long	Medium/ long

7.2 Policy influences in the transport sector

Organisations

Transport projects may involve a wide range of public and private organisations. We may distinguish:

- organisations involved in land use planning & transport infrastructures (e.g. local government, regional development agencies);
- organisations creating a demand for transport (e.g. employers; retailers; manufacturers);
- organisations supplying transport services (e.g. rail franchisers; bus & coach companies; airlines; airport authorities)
- organisations supplying transport technologies (e.g. vehicle manufacturers, component manufacturers, fuel suppliers);

Each of these may initiate transport projects and individual projects could involve organisations from more than one of these categories. Similarly, each type of organisation may be subject to a range of policy influences. In addition to 'climate policy' (such as the EU voluntary agreement on vehicle fuel efficiency), these include a much wider range of policies related to land use planning, infrastructure developments, public investment, technology promotion and so on. This creates a very complex policy landscape in which to assess additionality.

In the public sector, transport projects commonly involve regional and/or local government, as well as semi-autonomous bodies such as the Strategic Rail Authority, Regional Development Agency, National Park Authorities and so on. These are responsible for a range of activities including regulation, licensing, planning decisions and large-scale capital investment. All operate within a framework established by central government, but have substantial independence and autonomy. This means that any assessment of policy additionality for an individual project may need to examine the relevant policies of these bodies, as well as legislation and initiatives by central government. For example, transport planning within a local area will operate within the framework of Local Transport Plans. A very wide range of national, regional and local policy documents may therefore be relevant when assessing public policy influences on transport projects.

Also relevant are initiatives by multinational bodies such as the EU, the International Civil Aviation Organisation (ICAO) and the International Maritime Organisation (IMO). The EU has been influential in transport policy, most notably in concluding the recent voluntary agreement with motor manufacturers to reduce CO_2 emissions from new cars. In contrast, initiatives by the ICAO and the IMO have yet to have any serious impact on aviation and shipping. This means that domestic and international shipping and aviation remain largely unaffected by policy initiatives to reduce carbon emissions. Market incentives are leading to positive improvements in energy efficiency in these sectors, but these are outweighed by rapid increases in activity levels. Aviation & bunker fuels remain outside the Kyoto protocol and exempt from taxation. Both the EU and the UK would prefer to wait until international agreement has been secured on these issues, rather than introducing unilateral initiatives.

Policy framework

The framework for UK transport policy was set out in the 1998 White Paper *A New Deal for Transport: Better for Everyone* (DETR, 1998). This was followed in 2000 by *Transport 2010 - The 10 Year Plan* (DETR, 2000d), which outlined a £180bn spending programme, including £121 billion of capital investment, split fairly equally between railways, roads and local transport (including London). Relevant targets include a 50% increase in passenger use of the railway, an 80% increase in rail freight, a 10% increase in bus passenger journeys, up to 25 new light rail projects in major cities, 100 new bypasses and 360 miles of trunk road and motorway widening.

Following the White Paper, policy initiatives have been established in a range of areas. Key documents (available from the DTLR web site) include:

- A New Deal for Trunk Roads in England
- A New Deal for Railways
- From Workhorse to Thoroughbred: a Better Role for Bus Travel

- Breaking the Logjam: Consultation Paper on Implementation of Congestion Charging and Workplace Parking Schemes
- Sustainable Distribution: a Strategy
- Waterways for Tomorrow
- Guidance on Full Local Transport Plans
- Encouraging Walking: Advice to Local Authorities

As with transport projects, the character of transport policy is somewhat different from policy in the energy sector. Regulations, such as emission standards, are well developed for road vehicles but largely absent in other areas. Furthermore, while focusing on air pollutants, these standards generally do not extend to greenhouse gases. Instead, transport policy is dominated by a) direct support for capital or revenue expenditure; and b) guidance documents for developers and other actors, particularly in the area of land use planning.

Capital investment

The capital investment initiated by the 10 year plan is set out in more detail in Table 7.2. This represents a 70% increase in capital investment over the previous decade. It is notable that 46% of investment is anticipated to come from the private sector, through PPPs and other contractual arrangements. Government funding of regional and local transport initiatives is now guided by Regional Transport Strategies and Local Transport Plans, rather than being allocated on a scheme by scheme basis.

Table 7.2 Proposed UK capital investment on transport 2001 - 2010 (£billion)

Area	Public investment	Private investment	Total investment
Strategic roads	13.6	2.6	16.2
Railways	14.7	34.3	49.1
Local transport	19.3	9.0	28.3
London	7.5	10.4	17.8
Other transport	0.7	N/a	0.7
Unallocated	9.0	N/a	9.0
Total	64.7	56.3	121.0

Source: DETR, 2000d

Guidance

Government policy on land use planning typically involves *guidance* and encouragement, rather than mandatory requirements. An example is PPG6 on Retail Development and Town Centres, which discourages but does not prohibit the development of out-of-town shopping centres. In a similar manner, PPG13 on Transport offers broad-based guidance on all aspects of land use planning with the aim of: a) promoting more sustainable transport choices; b) promoting accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling; and c) reducing the need to travel, especially by car. This document provides an overall framework in which Local Transport Plans are developed and provides a strong steer towards lower carbon transport services. But given the multi-faceted and site specific nature of many planning decisions, together with the autonomy given to local government and other planning bodies, the government can only provide guidance and not mandatory requirements.

A related feature of UK transport policy is the reliance on *partnerships* between the public and private sectors, including the private funding of major infrastructural projects. Much of this is aimed at encouraging *voluntary* initiatives by different bodies, such as the adoption of Green Transport Plans by business, or the improvement of driver training by logistics companies.

This dominance of guidance and partnerships means that much policy influence in the transport area is at the 'soft' end of the spectrum (encouragement, information etc.) rather than mandatory requirements for specific actions. In general, if the changes brought about by a transport project are already *required, funded, supported or encouraged* by other policy initiatives, there is a risk that the policy additionality requirement will not be met. But additionality is clearly more difficult to assess when the dominant influences are guidance and encouragement, rather than specific requirements. Coupled with the multiple objectives, complex economics and system boundaries problems of transport projects described above, it is clear that the assessment of policy additionality for transport projects is particularly problematic.

Policies

The following four tables attempt to summarise some of the more important policy influences in the transport sector, distinguishing between reducing activity, changing modal structure, reducing energy intensity, and reducing carbon intensity. The tables use the same framework as in previous sections, but with an additional category of *public investment* which is relevant to infrastructure projects. Guidance material, such as that related to land use planning, is classified under 'education, information & moral suasion'. However, this form of guidance carries more weight, and may correspondingly have greater impact, than simple information programmes such as the EEBPP.

The list is illustrative and is not intended to be comprehensive. But it does illustrate the diversity of relevant policy influences in the transport sector. In contrast to previous sections, no attempt will be made to describe each policy at greater length as this would be too big a task.

Table 7.3 Policy influences on transport activity levels

Broad category	Instrument type	Key policies relevant to transport activity levels
Public investment	Public investment	• Investment plans by local authorities, within the framework of Local Transport Plans and including measures to reduce the need to travel. This is part funded by central government.
Education, information & moral suasion	Education, information & moral suasion	• All forms of guidance on land use planning, including in particular PPG13. This aims to locate development where it can be easily accessed by walking, cycling and public transport; creates a priority order of town centre locations, followed by edge of centre sites, district and local centres, and only then out of centre locations that are accessible by all forms of transport. All new development should be shaped by this guidance. • Regional Transport Strategies, ensuring co-ordination of transport investment that reflects wider land use planning considerations.
Voluntary approaches	Unilateral commitments	
	Public voluntary schemes	
	Negotiated agreements	
Economic instruments	Charge systems	
	Trading mechanisms	
	Financial instruments	
Command and control	Framework based standards	
	Performance based standards	
	Technology standards	

Table 7.4 Policy influences on transport modal structure

Broad category	Instrument type	Key policies relevant to transport modal structure
Public investment	Public investment	• *Rail investment:* including East & West Coast Main Lines, Channel Tunnel Rail Link, Thameslink 2000 upgrading of freight routes to major ports, improve commuter routes to London & other major cities, better integration with buses taxis & bicycles, etc. • *Strategic road investment*: including bypasses/widening schemes to reduce congestion, HGV lanes on congested routes, improvement of junctions, electronic technology for network management etc. • *Local transport investment:* within the framework of local transport plans and including bus priority systems, enhanced off-peak & night and services, improved bus links to deprived urban areas, park & ride schemes, local traffic management schemes, 20mph areas, safe routes to school, improved cycle lanes & cycle networks, new light rail lines in major cities, etc. • *London investment:* including upgrading the London Underground via a PPP, a new east-west rail link, new tram/guided bus systems, improved off-peak and night bus services, street management & local transport initiatives, extension of the Docklands light Railway, etc. • *Other investment:* including information/booking/ticketing services for integrated transport
Education, information & moral suasion	Education, information & moral suasion	• All forms of guidance on land use planning, including in particular PPG13, which aims to promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling • Guidance on transport planning in a range of areas, for example 'Encouraging Walking: Advice to Local Authorities' • General public awareness campaigns such as 'are you doing your bit?'
Voluntary approaches	Unilateral commitments	• Voluntary adoption of green transport plans schemes by local authorities, business, community organisations, schools, hospitals etc
	Public voluntary	

	schemes	
	Negotiated agreements	
Economic instruments	Charge systems	• Road use charging by local authorities, enabled (but not required) by government legislation, and with the requirement to spend the revenue raised on local transport improvements for at least 10 years • Levy on workplace parking by local authorities, enabled (but not required) by government legislation, and with the requirement to spend the revenue raised on local transport improvements for at least 10 years • Proposed pilot charging schemes for motorways & trunk roads
	Trading mechanisms	•
	Financial instruments	• Funding of voluntary green transport initiatives by schools & other bodies • Fuel duty rebate to bus operators • Extension of fuel duty rebates to more community transport services • Concessionary fares for groups such as the elderly • Rural bus subsidies, through the Rural Bus Partnership Fund and the Rural Transport Partnership Scheme • Ringfencing money from increases in fuel duty to fund improvements in public transport • Grants to promote rail freight
Command and control	Framework based standards	
	Performance based standards	• Enforcement of parking restrictions
	Technology based standards	

Table 7.5 Policy influences on transport energy intensity

Broad category	Instrument type	Key policies relevant to transport energy intensity
Education, information & moral suasion	Education, information & moral suasion	• European Commission fuel economy labelling schemes for new cars • EEBPP initiatives on freight & logistics, including improved driver training • General public awareness campaigns such as 'are you doing your bit?'
Voluntary approaches	Unilateral commitments	• Voluntary adoption of green transport plans schemes by local authorities, business, community organisations, schools, hospitals etc • Environmental best practice scheme by the Freight Transport Association
	Public voluntary schemes	• Voluntary agreements between the European Commission and European, Korean and Japanese car manufacturers to reduce average CO2 emissions from new cars to 25% below 1995 levels by 2008 • Motorvate programme to for green car & van fleets, including targets of a 12% reduction in CO2 emissions over a three-year period (3% of which through reduced mileage)
	Negotiated agreements	•
Economic instruments	Charge systems	• Exemption of electricity use the traction by rail freight operators from the CCL • Taxation of company cars according to CO2 emissions
	Trading mechanisms	
	Financial instruments	• Differential VED to encourage purchase of smaller, more fuel efficient vehicles • Differential on ultra low sulphur diesel to encourage adoption of direct injection technology • 100% first-year capital allowances for spending on information and communication technologies by small & medium-sized haulage companies
Command and control	Framework based standards	

	Performance based standards	• Enforcement of speed limits on roads
	Technology standards	

Table 7.6 Policy influences on transport carbon intensity

Broad category	Instrument type	Key policies relevant to transport carbon intensity
Education, information & moral suasion	Education, information & moral suasion	• information campaigns to encourage conversion of the vehicle fleets to alternative fields
Voluntary approaches	Unilateral commitments	
	Public voluntary schemes	
	Negotiated agreements	
Economic instruments	Charge systems	
	Trading mechanisms	
	Financial instruments	• Grants under the Powershift programme towards the additional cost of purchasing gas & electric vehicles
Command and control	Framework based standards	
	Performance based standards	
	Technology based standards	

Annex I: Inclusion of the domestic sector in the project scheme

The DTI have pointed out energy efficiency projects in the domestic sector are already incentivised by the Energy Efficiency Commitments imposed upon domestic energy suppliers (DETR, 2000e). In communication, it was noted that:

> 'It was felt to be unfair to impose targets on electricity and supply companies that require them to increase domestic sector energy efficiency measures and then allow other companies to carry out some of these projects themselves which would raise the cost to companies of meeting these targets.'[13]

Against this, the following points should be noted:

- The cost effective abatement potential in the domestic sector is very large. The recent UK Energy Review estimated the potential to be 15MtC/year by 2020, at a cost of -£300 to £50/tonne (PIU, 2002).
- The quality of the UK housing stock is acknowledged to be extremely poor, contributing to five million households living in 'fuel poverty'. This is the target of a major government strategy, including measures such as the Home Energy Efficiency Scheme to increase public and private investment in domestic sector energy efficiency.
- There is uncertainty over how the carbon savings in the domestic sector projected in the UK climate program will be achieved. Five times the savings of EEC 2002-2005 will need to be achieved in further EEC or HEES programmes from 2005-2010 if the targets are to be met (Ekins et al, 2001). Underachievement appears likely in this sector and may threaten attainment of the UK carbon target.
- The government has indicated it is desire to promote innovative methods for delivering energy efficiency in the sector, including energy service packages (Macklon, 2001).

In view of this, the argument for excluding the domestic sector from the project scheme appears to be weak. By doing so, major social, economic and environmental opportunities may be missed.

[13] DTI, personal communication.

References

Bathurst, G. and G. Strbac, (2001), 'The value of intermittent renewable sources in the first week of NETA', *Tyndall Briefing Note No.2*, 3rd April, Tyndall Centre for Climate Change Research, University of East Anglia.

CEC Commission of the European Communities (2001a), *Proposal for a Directive establishing a framework for greenhouse gas emissions trading within European Community and amending Council directive 96/61/EEC*, COM(2001)581, Brussels.

CEC Commission of the European Communities (2001b), *Proposal for a Directive on the energy performance of buildings*, COM(2001) 226, Brussels

CEC Commission of the European Communities (2001c), *Directive on the limitation of emissions of certain pollutants into the air from large combustion plants*, 2001/80/EC, Brussels

CEC Commission of the European Communities (2002), 'Non-paper on synergies between the EC emissions trading proposal (COM (2001) 581) and the IPPC Directive', D (02) 610019, 22nd January, Brussels, DG Environment.

CHPA Combined Heat & Power Association (2001), *A UK CHP strategy: opportunities and challenges*, CHP.

DEFRA Department of the Environment, Food and Rural Affairs (2001a), *A Guide to the UK Emissions Trading Scheme*, DEFRA, London.

DEFRA Department of the Environment, Food and Rural Affairs (2001b), *Implementation of Council Directive 1999/31/EC on The Landfill of Waste Second Consultation Paper*, DEFRA, London.

DETR Department of the Environment, Transport & the Regions (1998), *A New Deal for Transport: Better for Everyone*, Transport White Paper, HMSO, London.

DETR Department of the Environment, Transport & the Regions (1999), *Fourth consultation paper on the implementation of the IPPC Directive*, London: DETR, August.

DETR Department of the Environment, Transport & the Regions (2000b), *Quality Assurance for Combined Heat and Power: the government's decisions following consultation*, HMSO, London.

DETR Department of the Environment, Transport & the Regions (2000a), *The Building Act 1984: Building Regulations: Proposals for Amending the Energy Efficiency Provisions*, a Consultation Paper issued by Building Regulations Division, London, HMSO.

DETR Department of the Environment, Transport & the Regions (2000c), *Waste Strategy*, HMSO, London.

DETR Department of the Environment, Transport & the Regions (2000d), *Transport 2010: the Ten Year Plan*, HMSO, London.

DETR Department of the Environment, Transport and the Regions (2000e), *Energy Efficiency Commitment 2002-2005: the Government Provisional Conclusions*, HMSO, London.

DETR Department of the Environment, Transport & the Regions (2001), *Climate Change: the UK Programme*, HMSO, London.

DTI Department for Trade and Industry (1999), *New & Renewable Energy: Prospects for the 21st Century, Supporting Analysis*, March, Report R-122 produced by ETSU for the DTI, London, DTI.

DTI Department of Trade and Industry (2000), *Energy Paper 68: Energy Projections for the UK*, HMSO, London.

DTI Department of Trade and Industry (2001), *New & Renewable Energy Prospects for the 21st Century – The Renewables Obligation Statutory Consultation*, DTI, London.

Ekins, P., S. Sorrell & A. Smith (2001), *Forging An Energy Policy For Sustainable Development*, A Paper For The Energy Policy Review Of The UK Government from The Sustainable Development Commission, October 2001

ENDS Environmental Data Services (2001) 'Coal mine methane generators seek funding boost' *ENDS Report*, 315, April.

ENDS Environmental Data Services (2001b) 'Mine methane to gain climate levy exemption' *ENDS Report*, 320, September.

Environment Agency (2001) *Guidance for the Landfill Sector Technical requirements of the Landfill Directive and Integrated Pollution Prevention and Control (IPPC) – Consultation, November*, Environment Agency, Bristol.

Environment Agency (2001) *Horizontal Guidance Note IPPC H2 – Energy Efficiency*, 2nd Draft, January, Environment Agency, Bristol.

Fineman, S. (1998) 'Street-level bureaucrats and the social construction of environmental control', *Organisation Studies*, 19, 6, 953-974.

Hertin, J., Randall, T., Watson, J. and C. Gough (2001) *Renewable energy and combined heat and power sources in the UK*, SPRU Mimeo, Brighton.

Macklon, D. (2001), *Energy Services In The UK Domestic Sector: Barriers To Development and Recommended Action Plan*, Department of Trade and Industry, HMSO, London.

Mott MacDonald (2001), *Greenhouse Gas Emission Reduction: a study of options in the generation and transmission of electricity in the UK*, a report to the UK Department of Trade and Industry, Brighton.

OFGEM Office of Gas and Electricity Markets (2001), *Report to the DTI of the initial impact of NETA on smaller generators*. Available at: www.ofgem.gov.uk/docs2001/52_small_gens_review.pdf

OFGEM Office of Gas and Electricity Markets (2001b), *Review of the NETA and the impact on smaller generators*. Available at: www.ofgem.gov.uk/docs2001/summary_neta_review.pdf

PIU Performance & Innovation Unit (2001), *The Waste Project: A Performance and Innovation Unit Scoping Paper*, Cabinet Office, London.

PIU Performance & Innovation Unit (2001), *The Energy Review*, Cabinet Office, London.

RCEP Royal Commission on Environmental Pollution (2000), *Energy – the Changing Climate*, 22nd Report of the Royal Commission of Environmental Pollution, London, The Stationery Office.

Smith, A. (1997) *Integrated Pollution Control*, Avebury, Aldershot.

Sorrell, S. (2001), *Work Package 3: UK policy context: emissions trading*, a report to DG Research under the FPV project 'Interaction in EU climate policy', SPRU, Available from: http://www.sussex.ac.uk/spru/environment/research/interact.html

Sorrell, S. (2002) 'The meaning of BATNEEC: interpreting excessive costs in UK industrial pollution regulation', *Journal of Environmental Policy and Planning*, 4, 23-40.

Sorrell, S. et al (2000) *Barriers to energy efficiency in public and private organisations*, final report to report to DG XII under the JOULE project 'Barriers to energy efficiency in public and private organisations', October 2000